Instruction Manual

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Read this instruction manual thoroughly before installation, operation, maintenance or inspection of this product.

Symbols for Safe Operation

In this manual, NOTES FOR SAFE OPERATION are classified as "WARNING" or "CAUTION".



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.



Indicates a potentially hazardous situation which, may result in minor or moderate injury to personnel, and possible damage to equipment if not avoided, it may also be used to alert against unsafe practices.

Items described in Caution may also result in a vital accident in some situations. In cither case, follow these important notes.



Note for Safe Operation

♦ INSTALLATION

- Make sure to keep the install direction.
- Do not throw down and prevent from impact.
- Never use the equipment where it may be exposed to splashes of water, corrosive or flammable gases, or near flammable materials.(Failure to observe this warning may lead to electric shock or fire)
- Use the equipment in indoors.

WIRING

- For the input power supply of Servo drive, surely use AC200~230[V]
- Make sure to ground the ground terminal.
- Never connect the AC main circuit power supply to servo motor.
- Never connect the AC main circuit power supply to output terminals U, V and W.
- Use the compression terminal with insulated tube when wire the power terminal.
- Make sure that Power cable(U,V,W) and Encoder cable are separated when Connected.
- If the motor moves by Machine, please use Robot Cable.
- Disconnect the power wires surely after the input power is off and "CHARGE" Lamp is completely OFF.
- Surely use Twist pair shield cable for pulse command signal (PF+, PF-, PR+, PR-), speed command signal(SPDCOM), torque limit signal(TRQLIM).

OPERATION

- Before starting operation, check and adjust each menu.
- During operation, do not touch the shaft of motor.
- During operation, do not touch the heat sink.
- Do not connect or disconnect CN1, CN2, CN3 connectors while power is applied to the circuit.

GENERAL PRECAUTIONS

• Specifications are subject to change for product modifications and improvements. In this case, we issue the manual on updated Version NO.





Precaution at First Setup



- Make sure the Power Supply voltage (AC200~230[V]) and wiring before power is applied to the circuit.
- At first power apply, applied the power on Servo-OFF status.
- Verify the model No. of motor and the No. of Encoder pulse before power is applied to the circuit.
- Set the motor ID on menu[PE-201], number of Encoder Pulse on menu [PE-204]
- After finishing the above, set the operation mode of servo drive by linking upper motion controller on the menu [PE-601].
- Wire CN1 if servo drive according to each operation mode referring to "1.2 System Construction" (Refer to "5.5 Example of connecting to upper Controller")
- The ON/OFF state of each CN1 input contacts can be verified at CN1 contacts state.



- Do not repair, inspect, and replace the component except for authorized person.
- The alteration of products is not allowed in any case



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Product Configuration and Signals

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Product Construction

1.1.1 Checking Products

- ① Check if the products are the right one you ordered.
 - Check the types marked in the nameplates of Servo Drive
 - Check the types marked in the nameplates of Servo Motor
- 2 Check Product and Option Items.
 - Check if the cable types and length are right.
 - Check if the regenerative resistance is in accordance with the standard.
 - Check if the motor shaft is correct.
 - Check if the Oil Seal and Brake is correct.
 - Check if the reducer/gearbox and reduction ratio is correct.
 - Check if the Encoder type is correct.

③ Check the External Appearance

- Check if there is no dust or moisture
- Check if there is fading, contamination, damage, and disconnection
- Check if the tightness of fitting & bolts are correct.
- Check if there is no noise or excessive friction at rotating



Servo drive Type Designation



Identifying the Parts

Servo Motor

- Less than 80 Flange



- Over than 130 Flange



Servo Drive

- Small Capacity (APD-VN01 ~ VN02)



- Small Capacity (APD-VN04i)



1.2 System Composition

1.2.1 Summary

Servo System can be variously used as per the interface with Upper controller.

1) Position Operation System

Operate Servo by pulse command that operates the position of servo motor by ration of encoder pulse compared to command pulse.



Strength : Because of pulse input by transfer unit, upper controller is simple.

Weakness : High speed rotating is difficult at using precise transfer unit

Response characteristics are not good by using various steps of controller.

2) Speed Operation System

Operating servo by speed command that is analog or digital speed command.



Strong point : Response of servo is fast.

Easy to control precisely

Weak point : Upper controller is complicate.

3) Torque Operation System

Operating Servo by torque command that is analog voltage.



Strength : Response of servo is fast. Easy to control precisely

Weakness : Upper controller is complicate

4) Operation mode

According to interface with upper controller, Operating mode is as below

Operation Mode	System
0	Operating Torque mode
1	Operating Speed mode
2	Operating Position mode
3	Operating Speed/Position mode by selecting connector
4	Operating Speed/Torque mode by selecting connector
5	Operating Position/Torque mode by selecting connector

* Operation mode is set up on menu [PE-601]

1.2.2 Wiring

.



1.2.3 Position Operating Mode



Note1) RDY/ BRAKE Output contact signal : Select in [PE-508].

Note2) Surely use Twist pair shield cable for pulse command signal (PF+, PF-, PR+, PR-) and torque limit signal(TRQLIM).



1.2.4 Speed Operation Mode



Note1) RDY/ BRAKE Output contact signal : Select in [PE-508]. Note2) Surely use Twist Pair shield cable for SPDCOM, TRQLIM, GND.

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1.2.5 Torque Operation Mode



Note1) RDY/ BRAKE Output contact signal : Select in [PE-508]. Note2) Surely use Twist Pair shield cable for SPDCOM, TRQLIM, GND. Note3) Surely set Speed limit type by SPDLIM, SP01, SP2D terminal.



1.2.6 Speed/Position Operation Mode

Note1)Input contact MODE=ON: Speed control mode, MODE=OFF: Position control mode





Note1) Input contact MODE=ON: Speed control mode, Mode=OFF: Torque control mode

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1.2.8 Position/Torque Operation Mode

Note2)Input contact MODE=ON: Position control mode, MODE=OFF: Torque control mode

1.3 Signal Explanation

1.3.1 Input contacts signal

Pin	Namo	Eurotion and Line	Application table on operation mode						
No.	Name	Function and Use	Ρ	S	Т	S/P	S/T	P/T	
36	+24V IN	Input contact +24[V] power supply	0	0	0	0	0	0	
17	SPD2	Selecting Speed Command2 / Selecting Speed limit2	Х	0	0	O/X	0/0	X/O	
	EGEAR2	Switching electronic gear ratio2	Ο	Х	Х	X/O	X/X	O/X	
18	SPD1 Selecting Speed Command1 / Selecting Speed limit1		Х	0	0	O/X	0/0	X/O	
EGEAR1 Switching electronic gear ratio1		Ο	Х	Х	X/O	X/X	X/O		
MODE ON: Switching control mode		Х	Х	Х	0	0	0		
28	TRQLIM	ON : Torque limit by TRQLIM value OFF : Torque limit by parameter	0	0	0	Х	Х	Х	
30	SVON	ON: Servo Operating OFF: Motor free run	0	0	0	0	0	0	
31	CCWLIM	Prohibit CWW rotating (forward direction)	Ο	0	Ο	0	0	0	
22	CWLIM	Prohibit CW rotating (reverse direction)	0	0	0	0	0	0	
33	ALMRST	RESET at ALARM	0	0	0	0	0	0	
34	DIR	Selecting rotating direction	Х	0	Х	O/X	O/X	X/X	
35	STOP /PCLR /TCLR	Motor Stop at Speed Control Motor Stop at Position Control Motor Stop at Torque Control	0	0	0	0	0	0	

Note2) In case Speed operation, 'DIR' and 'STOP' contacts are operated as below by the menu [PE-514].

Set up [PE-514]	Operating Method								
	CCW		С	W	CCW				
	DIR	STOP	DIR	STOP	DIR	STOP			
0	OFF	OFF	ON	OFF	Х	ON			
1		ON	ON		ON	ON			
	UFF			UFF	OFF	OFF			

1.3.2 Analog Input Signal

Pin		Function and Llas	Application table on operation mode						
No.	Naine	Function and Ose	Ρ	S	Т	S/P	S/T	P/T	
0	SPDCOM Analog speed command (-10~+10[V])		Х	0	Х	O/X	O/X	X/X	
9	SPDLIM	Analog speed limit input (0~+10[V])	Х	Х	0	X/X	X/O	X/O	
8	TRQCOM	Analog torque command input (-10~+10[V])	Х	Х	0	X/X	X/O	X/O	
	TRQLIM	Analog torque limit input (0~+10[V])	0	0	Х	O/X	O/X	O/X	
7	GND	Analog Signal ground	0	0	0	0	0	0	

* On Analog speed command, In case of override speed operation (set up as "1" on menu[PE-405]),

operation is executed by speed command that is repeated on digital speed command.



1.3.3 Pulse Input Signal

Pin	Nama	Eunction and Use	Application table on operation mode						
No.	Name	Function and use	Ρ	S	Т	S/P	S/T	P/T	
1	PF+	Line drive(5V):F+ pulse input Open collector(24V):Not Used	0	Х	Х	X/O	Х	O/X	
2	PF-	Line drive(5V):F- pulse input Open collector(24V):F pulse input	0	Х	Х	X/O	Х	O/X	
3	PR+	Line drive(5V):R+ pulse input Open collector(24V):Not Used	0	Х	Х	X/O	Х	O/X	
4	PR-	Line drive(5V) : R- pulse input Open collector(24V) : R pulse input	0	Х	Х	X/O	Х	O/X	
29	PULCOM	Line drive(5V) : Not Used Open collector(24V) : +24V Power supply input	0	Х	Х	X/O	Х	O/X	

1.3.4 Output Contacts Signal

Pin	Namo	Eunction and Use	Application table on operation mode						
No.	Name	i unction and ose	Ρ	S	Т	S/P	S/T	P/T	
11/ 12	ALARM+/-	ALARM state output ON : normal state OFF : ALARM state	0	0	0	0	0	0	
13/	INSPD+/-	Output complete signal of target speed reaching	Х	0	Х	O/X	O/X	X/X	
14	INPOS+/-	Output complete signal of target position reaching	0	Х	Х	X/O	X/X	O/X	
15/	RDY+/-	ON at Complete operating ready state	0	0	0	0	0	0	
16	BRAKE+/-	Brake operating signal output (ON at servo dirving)	0	0	0	0	0	0	

1.3.5 Monitor Output Signal and Output Power Supply

Pin		Eurotion and Llas	Application table on operation mode						
No.	Naine	i unction and ose	Ρ	S	Т	S/P	S/T	P/T	
25	MONIT1	Analog monitor output1(-5~+5[V])	0	0	0	0	0	0	
26	MONIT2	Analog monitor output2(-5~+5[V])	0	0	0	0	0	0	
27	GND	Analog output signal ground	0	0	0	0	0	0	
5	+15V	+15[V]Power supply output terminal	0	0	0	0	0	0	
6	-15V	-15[V]Power supply output terminal	0	0	0	0	0	0	
7	GND15	Ground of operation power(15V)	0	0	0	0	0	0	

1.3.6 ENCODER Output Signal

Pin	Namo	Function and Use	Application table on operation mode							
No.	Naine	i unction and ose	Ρ	S	Т	S/P	S/T	P/T		
21 22 23 24	AO /AO BO /BO	Divide the Encoder signal by set values of menu [PE-501], [PE-511] (5[V] Line drive type)	0	0	0	0	0	0		
19 20	ZO /ZO	Encoder Z signal output by motor (5[V] Line drive type)	0	0	0	0	0	Ο		

Chapter 2

Installation

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2.1 Servo Motor

2.1.1 Working circumstances

Item	Working circumstances	Remarks
Temp.	0∼40[℃]	In case that the temperature exceeds the fixed range, you have
		to check with the R&D Dept. and place an order separately
Humidity	Less than 80[%]RH	No vapor
External	Vibration accel.speed	
vibration	Less than X, Y direction	Excessive vibration can shorten the life of bearing
	19.6[m/s°]	

2.1.2 Avoiding excessive shock

-In case that you shock the motor shaft or drop it, the encoder can be broken



2.1.3 Wiring

-If you apply common power to the motor directly, the motor can be damaged so you have to connect it to the proper drive

- The grounding terminal of the motor should be connected to one of two grounding terminal of drive and please connect the other with the 3 kinds of grounding



- The terminal, U,V,W of the motor should be consisted with the U, V,W of the drive.
- Please check the missing connector pin of the motor and bad connection
- In case that there is humidity or condensation in the motor, you have to check the insulation resistor is more than 10[MQ](500[V]) after installation

2.1.4 Connecting with load equipment

- Connection with coupling : Install the motor shaft and load shaft within the allowed ranged



- Connecting with pulley:

	Load of Radius		Load of shaft		Remarks			
Flange	direa	otion	direa	otion				
	Ν	kgf	Ν	kgf				
40	148	15	39	4	Less than Nr: 30[mm]			
60	206	21	69	7				
80	255	26	98	10				
130	725	74	362	37				
180	1548	158	519	53	Load of shaft direction			
220	1850	189	781	90				

2.1.5 Installing cable

- In case of vertical installation, don't let the oil or water flow into the connection part



- Don't damage or scratch the cable.

In case that the motor moves, you have to use the flexible cable and don't let the cable be waved.



2.2 Servo Drive

2.2.1 Working circumstances

- The working circumstances should meet the below requirements

Item	Circumstances	Remarks				
Temp.	0∼50[℃]	Attach the fan to the panel for ventilation within the allowed temp.				
Humidity	Less than 90[%]RH	In case of long stoppage, the moisture which is generated from freezing and condensation can damage the drive. When you run the motor after long stoppage, you have to remove the moisture thoroughly				
External Vibration	Vibration accel. speed Less than 5.9[ട്	Excessive vibration can shorten the life and cause malfunction				
Conditions	 No direct ray of light No corrosive e or inflammable gas No oil or dirt Good Ventilation in airtight place 					

2.2.2 Installing in a control board (panel)



-Refer to the below for installation gap in a control board

Note 1) Don't let the Installed regenerative resistor affect the drive such as generating heat.

Caution

- When you assemble a control board, don't let the metal dust which is generated by drill into the drive

-Prevent the oil, water, metal dust flowing into the break or roof

- Please protect a control board with air paper under the circumstance which has much noxious gas and dust

2.2.3 Wiring

- Check the voltage of input power and let it be within

Paution

Perform alarm rest after removing the main factors and turning the SVON off

- If you apply the common power to the terminal U,V,W of the drive, it can be damaged
- So please connect the power to L1, L2, L3 terminals
- The regenerative resistor which is connected to the drive B1, B2 should be standard value

Model	Resistor	Standard capacity	* Remarks		
VN01~VN04	100[<u>Ω</u>]	Built-in 30[W]	Caution		
VN07~VN10	40[Ω]	Exterior 140[W]	Refer to the "7.3. Options/ Surroundings when you		
VN15~VN20	23[<u>Ω</u>]	Exterior 300[W]	try to expand the capacity of regenerative resistor		
VN35	11.5[Ω]	Exterior 300[W] ×2			

- Apply the main power (L1, L2, L3) after providing control power (L1C, L2C) (Refer to "Chapter 3 Wiring)
- Please be noted that there will be high voltage for a while even after cutting off the main power

aution

To avoid electric shock, try to wire again after cutting off the main power and checking if the CHARGE lamp was turn off entirely

Select the shortest distance for grounding

The long grounding line can cause malfunction due to noise

Chapter 3

Wiring

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3.1 Internal Block Diagram

3.1.1 Block Diagram (Rated Output is less than 400[W])

$[APD-VN01 \sim APD-VN04]$



(Note1) B1-B2 short pin and Regenerative resistor is installed in ONLY APD-VN04 Type

3.2 Power Board Wiring

3.2.1 Wiring (Rated output is less than 400[W]) [APD-VN01 ~ APD-VN04]



- (Note1) It takes approximately 1~2 seconds before alarm signal is activated after power is connected. Press main power on switch for at least 2 seconds of longer.
- (Note 2): B1-B2 short pin and regenerative resistor(30[W], 100[Ω]) is installed in APD-VN04 Type
 (But, there are no regenerative circuit and regenerative resistor in APD-VN01, VN02 type)
 In case of regenerative capacity is large due to frequent acceleration / deceleration.
 At this time, Make sure that the optional Brake resistor should be big size resistor.
- (Note 주 3) For the electric wire that is to be used at Main circuit power board, strip the coating of wire about 10~12[mm] as below and use the exclusive terminal which is Ferule UA-F1512 (Made by Suh-il Electronics).



(Note 4) Connect or remove the wiring of main circuit power board after press the button (📥) of terminal.

3.2.2 Power circuit parts specification

Туре	01	02	04	07	10	15	20	35	
MCCB	ABS33bM(8A)			12A		16A	24A		
NF(Noise Filter)	NFZ-410SM					415SM	420SM	430SM	
MC	GMC-9(11A) equivalent			GMC-18(18/		A) GMC-4		10(35A)	
Power Wire	AWG16 (1.25 SQ)			AW (2 \$	G14 SQ)	AWG12 (3.5 SQ)		AWG10 (5.5 SQ)	
Compressed terminal	UA-F1512,SEOIL (10mm Strip&Twist)		GP110012 KET		GP110721 KET		GP110028 KET		
Regenerative resistor (Provided)	-	_	30[W] 100[Ω]	14 4(୦W ୦ନ	300W 23Ω		300W 23Ω×2P	
3.3 Timing Diagram

3.3.1 Timing diagram at power supplied

In the case of APD-VN01~VN04, Power is supplied to the control circuit if 3-phase power is connected to the L1, L2, L3 terminals.

Servo becomes RDY after maximum 500[msec] that is required to initialize the drive system inside,

In case of this after Relay off 30[ms] Servo becomes RDY.

and when the servo drive signal is turned ON, operation starts 25[msec] later.

Single, 3Phase	e Within 500[ms]	
Control power set	▶ 1 00ms	 300ms
Control program Initialization	Within 500ms	
Power good . Alarm		4
(Normal on)		
Relay/DB	Relay OFF /DB ON /DB OFF /DB OFF /DB OFF /DB OFF /DB ON /DB OFF /DB ON	Delay Time Relay ON /DB OFF
Servo RDY	y _→ _30[ms]	
SVON .	Servo ON Servo O	FF
PWM .	→ 25[ms] → PW	M OFF Delay Time ms]
BRAKE Output		OFF Delay Time
Motor SPD .	DBON	Below 0 SPD Free Run

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3.3.2 Timing diagram at Alarm occurred

If Alarm occurred in the drive system, PWM is shut off and the motor stops.

CAUTION - Check and remove causes of Alarm and turn OFF the servo motor operating command (SVON) before resetting Alarm.



3.4 Wiring of Control Signal

3.4.1 Input Contact Signal



3.4.2 Output Contact Signal



3.4.3 Analog I/O Signal



- (1) GND terminal must be O[V] of the control power supply.
- (2) Input signal command voltage is within $\pm 10[V]$, and input impedance is $20[k\Omega]$.
- ③ Output signal voltage of Monitor1(No.25), Monitor2(No.26) is ±5[V].
 Addition to this, when controlling analog input by variable resistance using offered power by drive, wiring is as under. The output capacity of this power is 30[mA] at maximum.
 Do not exceed this capacity.



3.4.4 Pulse Input Signal

(1) Line Driver(5[v])Pulse input.



(2) Open collector (24[V]) Pulse input



(3) NPN Open Collector Pulse command 12[V] or 5[V]



(Note1) When the power supply 12[V] is used: Resistance R=560~680[ohm], 1/2W When the power supply 5[V] is used: Resistance R=100~150[ohm], 1/2W When the power supply 24[V] is used: Resistance R=1.5[ohm], 1/2W (4) PNP Open Collector type pulse command



(Note 2) When the power supply 24[V] is used: Resistance R=1.5[kohm], 1/2W When the power supply 12[V] is used: Resistance R=560~680 [ohm], 1/2W When the power supply 5 [V] is used: Resistance R=100~150[ohm], 1/2W

3.4.5 Encoder Output Signal

The encoder signal is produced based on 0[V] (GND) of control power supply. So please contact 0 [V] terminals and GND of CN1 at Upper controller. Encoder signal is produced in line drive system after the AC servo motor encoder signal received From CN2 is divided according to the frequency dividing ratio set by the menu [PE-510] [PE-511] (Pulse Out Rate).



3.5 Wiring of Incremental Encoder Signal (CN2)

3.5.1 Small-size Motor (Flange 40, 60, 80)





Chapter 4

Menu Operation

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4.1 Loader Operation

4.1.1 Name of Each Part



4.1.2 Menu Operation

1 Logic of Menu



4-2 меслио

2 Menu Editing



* Change Value: Up

Initial Blinking digit

- Shift to the menu for editing in the same method of $\, \textcircled{}$
- After above, press[Enter] Key, then data of menu is displayed "13" And, the last digit is blinking ; you can change the value where blink is located.
- For moving the blinking position, press [Left] or [Right].
- For changing value, press [Up] Key, then value is increased. At this time, the numerical value turns back to "0" when it exceeds "9".
- When editing is completed, press [Enter] Key, then value is saved and return to menu.
- * When return to Menu without saving the value Press [Left], [Right] at one time, then display is returned to Menu with display of "ESCAPE".
 - 3 Error in menu editing
- Error is as below.

Display	Cause					
notuSE	Menu that is used or impossible to set up					
	- In case of the menu is impossible to edit at Servo ON.					
	- Error in editing Motor relative constant.					
Err1	- Input the value that does not have Motor ID.					
	- In case of editing detailed constant on the state that Motor					
	ID is not "0"					
Err2	When setting the data that is out of range					
5 **3	Menu setting[PC-810] is locked.					
EII3	It should be unlocked.					

- ④ Special handling function.
- In case of setting I/O state menu, the function of each key is handled as exclusive way. For a detailed, refer to chapter 5, Handling and Operating.
- Alarm Handling menu
- I/O setting menu
- Test operation menu
- Gain tuning menu
- Z position operation menu
- Absolute encoder reset
- Current offset compensation menu
- Menu Handling menu

4.2 Menu Operation

4.2.1 Menu Summary

Menu consists of 9 menu groups, and function of each menu is as below.

Comm. Code	Name of Menu Group	Function
Pd-001 ~ Pd-020	Status Menu	Indicate operation status information of Each Servo.
PA-101 ~ PA-120	Alarm Menu	Save & Indicate records of Alarm that is Happened before.
PE-201 ~ PE-220	System Menu	Save information of system construction
PE-301 ~ PE-320	Control Menu	Save set variables that are related to control.
PE-401 ~ PE-420	Analog Menu	Save set variables that are related to analog I/O.
PE-501 ~ PE-520	InOut Menu	Save set variables that are related to I/O connection.
PE-601 ~ PE-620	Speed Operation Menu	Stores set variables that is related to Speed operation
PE-701 ~ PE-720	Pulse Operation Menu	Save set variables that are related to position pulse operation
PC-801 ~ PC-820	Command Menu	Execute operation handling

From the below menu table, the abbreviation for each mode means ;

- P: Used at Position control mode
- S: Used at Speed control mode
- T: Used at Torque control mode

4.2.2 Operation State Indicating Menu

	M	ENU	Unit	INI	Description					
Com Code	CODE	NAME	Min	Max	Description					
0	Pd-001	Current State		_	Display current operating status. Display Description nor-on Normal Servo On nor-oF Normal Servo Off AL-XX Alarm with applied code - When reset after removing Alarm cause, the display is decided by "Start Menu no. [PE-209].	PST				
1	Pd-002	Current Speed	[r/min] -10000	0 10000	Display Current Speed.	PST				
2	Pd-003	Command Speed	[r/min] -10000	0 10000	Display Current command speed.					
3	Pd-004	Current Pulse	[pulse] -99999	0 99999	Display cumulative position command pulse. - Display input cumulative command pulse from					
4	Pd-005	Feedback Pulse	[pulse] -99999	0	Display feedback cumulative position Command pulse. - Display feedback cumulative position Command pulse from Power On. - When exceed Max. Min. Value, only Min.(0), Max.(99999) is displayed	PST				
5	Pd-006	Pulse Error	[pulse] 0	0 99999	 Display remained pulse which must be operated. Difference between commanded pulse and feedback pulse (the motor must be operated as the amount of this value). Remained pulse no. at Servo OFF will be disappear when servo is On. 	Ρ				
6	Pd-007	E-Gear N0	1	1000 60000	Display numerator 0 of electronic Gear ratio. - When gear ratio is changed from abrasion of Machine, to compensate this abrasion, Offset adjusting can be used[PE-712]	Ρ				

			[%]	0	Display Current commanded torque at torque	Т
7	Pd-008	Command Torque	-300.00	300.00	Mode.ModeDisplay TypeTorqueCurrent command TorqueSpeedCalculatedCurrentcommand torque-DisplaycurrenttorqueasPercentagecompare with rated torque.	
			[%]	300	Display Torque Limit setting Value.	PST
8	Pd-009	Torque Limit	-300	300	- Display Max. torque value which motor can make as percentage value compare with rated torque.	
			[%]	0.00	Display current load ratio compare to rated	PST
9	Pd-010	Current Load	0.00	300.00	load. - Load which is made by motor is displayed as percentage compare to rated load.	
			[%]	0.00	Display average load ratio for 5 seconds.	PST
10	Pd-011	Average Load	0.00	300.00	 Average load ratio for 5 seconds which is made by motor is displayed as percentage 	
			[%]	0.00	Display peak load ratio compared to rated.	PST
11	Pd-012	Maximum Load	-300.00	300.00	- Display the peak load as percentage compare to rated load from Servo On	
			[V]	0.0	Display DC Link Voltage of Main power.	PST
12	Pd-013	DC Link Voltage	0.0	500.0	 DC Link Voltage of standard drive which is using 220[V] is around 300[V]. Max. Allowable DC Link Voltage of standard drive which is using 220[V] is 400[V]. When regenerated energy is big or the capacity of regenerative resistor is small, DC Link voltage is excess to Limit, then Over Voltage [AL-10] is displayed. Less than 380[V] in regenerative sector is recommended. 	

			_	_	Display H/W contact condition of CN1 I/O. Display	PST
13	Pd-014	I/O SET Display	_	_	$[Input contacts : UP] \\ \hline 0 \\ \hline 23 \\ \hline 56 \\ \hline 8 \\ \hline 0 \\ \hline 23 \\ \hline 56 \\ \hline 8 \\ \hline 8 \\ \hline 0 \\ \hline 23 \\ \hline 56 \\ \hline 8 \\ \hline 8 \\ \hline 0 \\ \hline 0 \\ \hline 1 \\ \hline 2 \\ \hline 3 \\ \hline 0 \\ \hline 1 \\ \hline 2 \\ \hline 0 \\ \hline 1 \\ \hline 2 \\ \hline 3 \\ \hline 0 \\ \hline 0 \\ \hline 0 \\ \hline 1 \\ \hline 2 \\ \hline 3 \\ \hline 0 \\ \hline $	
			0	0	Display setting state of operating time for	PST
14	Pd-015	Reg. Brake Time	[ms]	3000	regenerative resistor. Display the Value of [PE-419].	
			_	_	Display finial I/O contacts setting condition of	PST
15	Pd-016	I/O State Display	_	_	Image: Civit I/O. Image: Civit Ci	

			_	01100	Display Setting Logic of input contacts $0 \sim 4$	DOT
				01100	(A contacts : 0 B contacts : 1)	P31
16	Pd-017	Input Logic Display (State of input logic 0 ~4)	00000	11111	$I/O: \begin{array}{c} 4 & 3 & 2 & 1 & 0 \\ \hline \\ I/O: & 4 & 3 & 2 & 1 & 0 \\ \hline \\ INI value: & 0 & 1 & 1 & 0 & 0 \\ \hline \\ \hline \\ 4 & 3 & 2 & 1 & 0 \\ \hline \\ STOP & CWLIM & CCWLIM & ALARM & SVON \\ \hline \end{array}$	
			_	0000	Display setting logic of input contacts $5 \sim 8$.	
17	Pd-018	Input Logic Display (State of input logic 5 ~8)	0000	1111	(A contacts: 0 , B contacts: 1) I/O: $\begin{array}{c c} 8 & 7 & 6 & 5 \\ \hline & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline & & & &$	
			_	001	Display setting logic of output contacts.	
18	Pd-019	Output Logic Display	000	111	(A contacts : 0, B contacts : 1) $I/O: 2 1 0$ $I/O = 0 0 0 1$ $I/O = 0 0 0 1$ $I/O = 0 0 1$ $I/O = 0 0 0 0 1$ $I/O = 0 0 0 0 1$ $I/O = 0 0 0 0 0 1$ $I/O = 0 0 0 0 0 0 0 0 0$ $I/O = 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0$	
			_	-	Display software version.	PST
19	Pd-020	Software Version			$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	

* When return to Menu from Alarm condition, press [Left] or [Right] then [Enter].

4.2.3 Alarm state indicating Menu

MENU			Unit	INI	Description	Арр	
Com	CODE	NAME	Min.	Max.	Description		
Alarm history 01 ~ 20			-	-			
20	PA-101	Alarm History01			Display Alarm state that happened before	DOT	
~	~	~	—	-	Display Alam state that happened before	FOI	
39	PA-120	Alarm History20					

Alarm code and Details

CODE	Name	Cause	Check Point
nor-oF	Normal svoff	Servo OFF normal condition	-
nor-on	Normal svon	Servo ON normal condition	-
AL-01	Not used		
AL-02	Low Voltage	Low voltage or Turn off of Main Power	Check input voltage level, Wiring of Power
AL-03	Line Fail	U,V,W wiring error (motor, encoder)	Check parameter, CN2 wiring, U,V,W wiring, Replace motor
AL-04	Motor Output	Error of output open error	Check IPM module or U,V,W wiring
AL-05	Encoder Pulse	Setting error for No. of encoder pulse	Check parameter [PE-204], CN2 wiring, replaced motor
AL-06	Following Error	Pulse following Error	Check Wiring, Limit contacts, over range of input pulse, gain, setting value of [PE-502], [PE-718]
AL-07	Over Heat	Over Heat	Check load condition, Fan.
AL-08	Over Current	Over Current	Wiring, Motor PTP resistor, encoder setting value, replace drive
AL-09	Over Load	Over Load	Load condition, Brake condition, wiring, Motor, encoder setting value
AL-10	Over Voltage	Over Voltage	Input power, condition of regeneration resistor
AL-11	Over Speed	Over Speed	Check Encoder, wiring, Gain, or replace Motor
AL-12	Not Used	Not Used	
AL-13	Position Pulse error	Position Pulse error	Replace Drive
AL-14	ABS Data Error	ABS Data Error	Initial reset
AL-15	ABS Battery Error	ABS Battery Error	Initial Reset, battery discharge
AL-16	ABS Multi Error	ABS Multi Data Error	Initial Reset
AL-17	ABS Read Fail	ABS. encoder reading error	Check Abs. encoder, CN2 wiring
AL-18	U-Hall Offset Error	U phase current sensor error	Replace Drive
AL-19	V-Hall Offset Error	V phase current sensor error	Replace Drive
AL-20	Memory Error	Parameter Memory Error	Replace Drive
AL-21	Not Used	Not used	
AL-22	Data Init Error	Data Init Error	Replace Drive
AL-23	EPWR	H/W error, Power error of 9line encoder	Replace Drive
AL-24	USB Error	USB Communication error	Check wiring, replace Drive
AL-25	RS422 Error	RS422 Communication error	Check wiring, replace Drive
AL-26	Over Regeneration	Over Regeneration (error of [PE-419] setting time)	Check Input power, regeneration resistor, Replaced drive
AL-27	Current Limit Over	Excess limited current (Over 1 sec.)	Check Motor wiring and Load condition
AL-28	Not Used	Not used	
AL-29	Not Used	Not used	
AL-30	In/Out Logic error	Error of I/O setting logic	Change parameter value
AL-31	Encoder N/D Error	Encoder N/D Error	Change parameter value
AL-32	Egear N/D Error	Egear N/D Error	Change parameter value
Err1	Error1	Edit menu which is not allowed to edit under Servo-on condition	Edit parameter after Servo-off
Err2	Error2	When set over scope of data to parameter	Set parameter within scope
Err3	Error3	When edit menu under (Menu data Lock) [PC-810] condition	After changing [PC-810] parameter to Unlock, Edit menu of parameter.

4.2.4 System Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

	ME	INU	Unit	INI	Description		Арр			
Com	CODE	NAME	Min.	Max.	Description			Mode		
			_	_	Set Mo	tor ID				PST
40	*PE-201	Motor ID	0	99	- Input param - Para followe & Refe App	Motor ID eter for me meter [PE d motor ID er to Motor endix. 2	into N otor is -210] autor ⁻ Type	Menu, then a automatica ~ [PE-218 matically. and ID from	all of related Ily changed. 3] is set as	
			[bps]	0	Set RS4	422 Comm	unica	tion Speed a	at CN3	PST
41	*PE-202	RS422 Baud Rate	0	3		No. 0 1 2 3	Co	ommunicatio 9600[bp 19200[bp 38400[bp 57600[bp	n Speed s] os] os] os]	
42	**PE-203	Encoder Type	0	0	Set app Type of No. 0 1 2 3 4 Cautior actual operat	olied Encod f encoder i Encoder 15Lin Paralle 15Lin Paralle 9Line Par 9Line Par 7Line Se n) If encoder encoder ted with ur	der. is as f Type e el el rallel rallel erial der typ on istable	Followed. Method A Phase Lead B Phase Lead A Phase Lead B Phase Lead Inc. 17~21bit pe will not m motor, Mot e speed	Signal A,B,Z, U,V,W A,B,Z, U,V,W A,B,Z, A,B,Z, Commui -cation	PST

			[p/r]	2500	Set PPR (Pulse per resolution) of encoder.	PST
43	**PE-204	Encoder Pulse	1	6000	 When the encoder which is used A.B pulse signal, Set No. of Pulse per 1 rotation. At this time the no. of pulse for A, B is the same. Caution) If encoder type will not matched with actual encoder on motor, Motor can be operated with unstable speed . 	
			[%]	300	Set Limit Torque for CCW.	PST
44	PE-205	CCW TRQ Limit	1	350	- Setting value is the percentage of rated Torque. And default value is 300[%].	
			[%]	300	Set Limit Torque for CW	PST
45	PE-206	CW TRQ Limit	1	350	- Setting value is the percentage of rated Torque. And default value is 300[%].	
			_	0	Set Drive ID at Communiation.	PST
46	*PE-207	System ID	0	99	 When Servo is communicated with RS422 communication or BUS communication, the nominated Servo ID can be used. Servo can be communicated individually with identified ID 	
			_	0	Set Drive Group ID at Communication.	PST
47	*PE-208	System Group ID	0	99	- When several drives are operated as group, Group ID can be used.	
			_	2	Set drive start Menu.	PST
48	PE-209	Start Menu No.	1	20	- Set the parameter which is displayed when drive servo ON from [Pd-001] to [Pd-020]	

			[gf·cm·s ²]	ID	Set Motor Inertia.	PST
49	*PE-210	Inertia	0.01	300.00	- When [PE-201](Motor ID) is "0", Editing is possible	
			[kgf·cm/A]	ID	Set Motor Torque constant.	PST
50	*PE-211	Trq Con	0.01	300.00	- When [PE-201](Motor ID) is "0", Editing is possible	
			[mH]	ID	Set Motor Phase Ls	PST
51	*PE-212	Phase Ls	0.001	30.000	– When [PE–201](Motor ID) is "0", Editing is possible	
			[ohm]	ID	Set motor Phase Rs.	PST
52	*PE-213	Phase Rs	0.001	30.000	– When [PE–201](Motor ID) is "0", Editing is possible	
			[A]	ID	- Set motor rated current.	PST
53	*PE-214	Rated Is	0.01	999.99	- When [PE-201](Motor ID) is "0", Editing is possible	
			[r/min]	ID	Set motor Max. speed.	PST
54	*PE-215	Max Speed	0.0	300.00	- When [PE-201](Motor ID) is "0", Editing is possible	
			[r/min]	ID	Set Motor rated speed	PST
55	*PE-216	Rated Speed	0.0	10000	– When [PE–201](Motor ID) is "0", Editing is possible.	
			[pole]	ID	Set Motor Pole no.	PST
56	*PE-217	Pole Number	2	98	– When [PE–201](Motor ID) is "0", Editing is possible.	
57	*PE-218	Motor Gain Group	_	0	Set Motor Gain Group	
57			0	9	- When [PE-201](Motor ID) is "0", Editing is possible .	
58	PE-219	U Current Offset	[mA]	0	Display Uphase current Offset	
		Display	-200	200		
1	1	V Current Offset	[mA]	0		
59	PE-220		[-	Display V phase current Offset	

4.2.5 Control Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

	MENU		Unit	INI			D -				Арр
Com	CODE	NAME	Min.	Max.			De	scription			Mode
			[Times]	2.0	Set Ine	Set Inertia ratio for Load					
					 When motor is operated with No load condition, the Inertia ratio is "1". Set proportion mechanical system load inertia to motor inertia which is on our catalog To optimize servo operation, accurate Inertia Ratio setting is required. 						
					- Refe	erence i	range fo	or Positic	on, Speed	gain as	
					follow	ed Inerti	a ratio				
		Inertia Ratio			Motor	Inertia	a ratio	Gair	n setting ra	ange	
			1.0	500.0	Frange	Туре	Inertia	Position P Gain	Speed P Gain	Speed I Gain	
						Low	1~5	50~120	500~120	5~30	
	PE-301				40	Middle	5~20	40~80	400~600	10~50	
60						High	20~40	30~60	300~500	20~70	
					60	Middle	5~15	20~70	200~500	20~60	
					~ 80	High	15~30	10~40	100~300	50~100	
					100	Low	1~3	40~80	300~600	10~50	
						Middle	3~8	20~60	100~400	20~80	
					~130	High	8~15	10~40	50~200	50~150	
					180	Low	1~3	30~70	150~400	20~60	
					~220	Middle	3~5	15~-50	80~300	30~100	
						High	5~8	5~30	50~200	50~150	
					₩ Ref each n	er to M	Motor s Chapte	pecifica er 6.	tion for i	nertia of	

			[1/s]	50	Set Position control P Gain 1.	Ρ
61	PE-302		1		P Com. P Com.	
		Position P Gain1		500	- Increase the gain till Speed over shoot or Vibration of motor.	
					- When Gain Conv. Mode [PE-520] is 1, Pulse error is applied less tan [PE-306] (Position Zero gain).	
					- Not applied when [PE-601](Mode selection)is Speed mode or Torque mode.	
					*Recommended value = Speed P Gain / 10	
		Position P Gain2	[1/s]	70	Set Position control P Gain 2.	Р
	PE-303				- This value is set as same or bigger than [PE-302](Position P Gain 1), Increase the value until speed over shoot or vibration of motor.	
62			1	500	- When Gain Conv. Mode [PE-520] is 1, When Pulse error range is over range of [PE-319](Position P Gain 2) in position mode. This parameter is applied.	

			[%]	0	Set control ratio of position feed forward.	Ρ
63				100	P Com. P Com.	
	PE-304	P Feedforward	0	100	- Use to reduce the time of settled position with get inclination from differential value, then add speed command to this inclination	
					- if this value is big, overshoot can be occurred or system can be unstable. So the value must be increased from small value to big value step by step to find optimized value.	
			[ms]	0	Set Position Feed forward control time constant	Р
64	PE-305	P FF FLT TC	0	100.00	 Gain + Position error P Gain + S Com P Com. + Position error P Gain + Com Current position Current position 	
			[10pulse]	0	Set range of change from P gain1 to P gain 2.	Ρ
65	PE-306	Position Zero Gain	0	5000	- When [PE-520](Gain Conv. mode) is 1 위치제어모드에서 When Pulse error is bigger than [PE-306](position Zero gain range) under position mode, P gain1 is changed to P gain 2	



			[rad/s]	500	Set Speed P gain 1	PS
66	PE-307	Speed P Gain1	0	5000	Diagram of Speed control is as follows. Analog Scom Met(PE-311) Digital S. com (PE-312) - Speed P gain convert to torque command with multipling Speed P gain error to P-Gain. - Relation between Speed P gain & Actual Speed S Com S Com S Com Com S Com Com S Com Com Com Com Com Com Com Com	
		속도비례게인2	[rad/s]	800		PS
67	PE-308	Speed P Gain2	0	5000	 Set Speed P gain 2. This value is set as bigger value than [PE-307]. When [PE-520](Gain Conv. mode) is 1 When actual speed is higher than [PE-313](0 SPD Gain SPD), Speed P gain1 is changed to Speed P gain 2 	

			[ms]	20	Set Speed I TC1.	PS
					Analog S Com S. Com Fitt. [PE-311] Digital S Com - Current S S F Filt. S F Filt. S F Filt. S F Filt. S C - Current S S F Cain (PE-307) - Current S S F Cain (PE-307) - Current S S F Com - Current S S F Com - Current S S F Com - Current S S F Com - Current S - Current S - Current S - Current S - Current S - Current S - Current S - - - - - - - - - - - - -	
68	PE-309	Speed I TC1	1	10000	S Com Speed B Com Speed B Com Speed C Com	
					- Recommend setting value:10000/Speed I gain[PE-307]	
					- This value is set by lower than [PE-309].	142
			[ms]	13	- in case of [PE-520](Gain Conv. mode) is 1	
69	PE-310	Speed TC2	_		When Actual speed is over [PE-313](Zero SPD	
					Gain Speed), Speed I Gain1 is changed to Gain2.	
			1	1000		

			[ms]	0.50	Set Speed command filter	S
70 PE	-311	Speed IN FT	0.0	100.00	Analog S. Com Fit [PE-311] Digital S. Com Curent S Curent S Curent S (PE-312] (PE-309) (PE-303) (PE-313] (PE-313] (PE-307)	
			[ms]	0.50	Set Speed feedback filter	PS
71 *PE	E-312	Speed F/B FT	0.0	100.0	 Analog SPD complete store in the store is real point of the store is needed. When setting big value, make decreased response speed or with stop vibration at stop condition system can be unstable condition, so proper value is needed. When system is unstable with stop vibration Set applied range with [PE-313](ZSPD gain speed). When speed is lower than [PE-519](ZSPD gain rate) Vibration is controlled by adjusting of Gain rate. * Recommended Setting value = 0 ~ Speed Gain [PE-200](10) 	

			[r/min]	0	Set speed range of Zero speed gain.	PS
72	PE-313	Z SPD Gain Speed	0	500	Analog S. Com Analog S. Com Fit. [PE-31] Digital S com Current S S F filter Current S S F filter S F filter S C Current S S F filter S C Current S S F filter S C Current S S C S C S C Current S S C S C S C S C S C S C S C S	
			[ms]	0.50	Set Torque filter.	PST
73	PE-314	TORQ. CMD FLT	0.0	100.00	 Remove the noise of commanded signal with setting digital filter for analog torque command voltage. When setting big value, make decreased response speed, proper value is needed. 	
			_	0	Set function of DE-Resonance operation.	PST
74	PE-315	DE-Resonance	0	1	(under developing) Mode De-Resonance operation 0 Not operated 1 Operated T Out De Resonance Fre. [PE-316] T output Fre. DR operation BW[PE-317] - As followed system, the mechanical vibration can be occurred at certain frequency range. At this range of frequency Reduce the vibration which is caused by de-resonance with reducing torque output.	

75	DE-216	Noteb Englished	[Hz]	300	Set avoid resonance driving frequency.	PST
75	PE-310	Notch Frequency	0	1000		
70		Natab Dandwidth	[Hz]	100	Ost sucid recorded a band width	PST
70	PE-317	Notch Bandwidth	0	1000	Set avoid resonance band width.	
		Pool time Auto	_	0	(Under developing)	PST
77	PE-318		0	1	0: Not used	
		runng	0	I	1: Used	
			[10pulse]	20	Set pulse range of position P gain 2.	S
78	PE-319	Position Gain2 Range	1	5000	- Error pulse is over than the setting range of [PE-319](position P gain 2 range),, [PE- 303](Position P gain 2) is applied.	
			_	1	Set zero speed torque improved function.	S
79	PE-320	Zero Speed Lock	0	1	Mode Zero improve Speed 0 Not used 1 Use - Determine stop torque improved algorithm is applied or not. - After input contacts 'STOP', under the condition of below 100[rpm] or zero speed clamp[PE-403] is 1, The mode is automatically changed Speed mode to position mode when the value is below than zero speed clamp voltage [PE-404].	

4.2.6 Analog I/O Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

	MENU		Unit	INI	Description	Mode
Com	CODE	NAME	Min	Max	Description	wode
			[r/min]	2000	Set analog speed command at 10[V].	ST
80	*PE-401	Analog Speed	1	6000	The unit of analog speed command 10[V] is [r/min].	
			[mV]	0	Set Analog Speed command offset.	S
81	PE-402	Analog Speed Offset	-1000	1000	- Because of analog circuit problem, certain voltage is occurred during "0" torque command condition. At this time compensate this voltage with setting of certain voltage as offset.	
			_	0	Set mode of clamp for analog zero speed	S
82	PE-403	Zero Speed Clamp	0	1	command. Mode Zero clamp function Not operated S -10[V] $+10[V]0$ $-10[V]$ $+10[V]SPD Com clamp mode [PE-403] = 01$ 0 0 0 0 0 0 0 0 0 0	
00		Sclomp Valt		1	Set range of analog 0 speed clamp	S
03	r⊏-404	Sciamp volt	1	1000		

		Speed Override	_	0	Set speed override operation mode. - Set analog speed override on digital speed	S
84	*PE-405		0	1	Mode Speed Override operation 0 Not operated 1 Override operation	
			[%]	100	Set analog torque command at 10[V].	PST
85	*PE-406	Analog Torque	1	300	- Set analog torque command value compare with rated torque value as percentage at 10[V] at this time setting is within a range of torque limit [PE- 205] [PE-206] system variable setting.	
			[mV]	0	Set offset of analog torque command.	Т
86	PE-407	Torque Offset	-1000	1000	 Because of analog circuit problem, certain voltage is occurred during "0" torque command condition. At this time compensate this voltage with setting of certain voltage as offset. 	
			_	0	Set clamp mode at analog zero torque	Т
87	PE-408	TClamp Mode	0	1	command. Mode Zero torque clamp function Not operated -10[V] 0 -10[V] 0 torque clamp mode [PE-408] = 0 Operated -10[V] 1 Operated -10[V] 0 torque clamp v[PE-409] 0 torque clamp mode [PE-408] = 1	

			[mV]	1	Set analog Zero torque command clamp	Т
88	PE-409	TClamp Volt	1	1000	voltage.	
			_	1	Set analog output1 type for monitor.	PST
89	PE-410	Monitor Type1	0	5	Mode Data Mode Data 0 Com. Speed 4 Com. Frequency 1 Cur. Speed 5 Err. Pulse 2 Com. Torque 3 Cur. Torque 3 Cur. Torque - - 2 Kinds of 5[V] Analog output is possible.	
					And output as followed setting parameter.	
			_	0	Set mode of analog output 1 mode for	PST
90	PE-411	Monitor Mode1	0	1	ModeOutput type0Direction: output -5 ~ 5[V]1Absolute : output 0 ~ 5[V]	
			_	1.0	Set Scale of analog output 1.	PST
91	PE-412	Monitor Scale1	0.1	50.0	DC 5[V] is standard. Item Scale Speed Max. speed [PE-215] Torque Max speed [300[%]] Frequency 500[kpps] Error pulse Position Error [PE-512] - When output value is very small or big, the output can be change to properly with magnification	



			[mV]	0	Set offset of analog output 1 for Monitor.						
92	PE-413	Monitor Offset1	-1000	1000	- Because of analog circuit problem, some voltage can be occurred during "0" voltage output. At this time, can set offset range. The unit is [mV]						
			_	3	Set analog output2 type for monitor.						
93	PE-414	Monitor Type2	0	5	ModeDataModeData0Com. Speed4Com. Frequency1Cur. Speed5Err. Pulse2Com. Torque-3Cur. Torque2 kinds of 5[V] Analog output is possible.And output as followed setting parameter.						
94	PE-415	Monitor Mode2	_	0	Set mode of analog output 2 mode for						
			0	1	ModeOutput type0Direction: output -5 ~ 5[V]1Absolute :output 0 ~ 5[V]						
			_	1.0	Set Scale of analog output 2.						
95	PE-416	Monitor Scale2	0.1	50.0	DC 5[V] is standard.ItemScaleSpeedMax. speed [PE-215]TorqueMax speed [300[%]]Frequency500[kpps]Error pulsePosition Error [PE-512]- When output value is very small or big, the output can be change to properly with magnification.						

		Monitor Offset2	[mV]	0.0	Set offset of analog output 2.						
96	PE-417		-1000	- Because of analog circuit problem, som 000 1000 voltage can be occurred during "0" voltag output. At this time, can set offset range. Th unit is [mV]							
			_	0	Select rotation direction of motor in Torque	Т					
97	PE-418	Torque Com Dir	0	1	ModeSelection of torque Dir0At + voltage: forward1At - voltage: forward						
			[ms]	500	Set Max. Operation time of regeneration brake						
98	PE-419	Regeneration Brake time	100	1000	resistor. - When regeneration brake resistor is operated over setting time, [AL-26](over regeneration) is displayed.						
			-	0	Apply analog offset function [PC-813], [PC-						
99	PE-420	Analog Speed, Torque Command Offset	0	3	 814]. Some voltage on analog signal circuit can be occurred during O speed command. At this time Set applied function to set torque command voltage offset automatically With selection of below mode, Analog Speed command voltage offset [PC-813] and Analog torque command voltage offset[PC- 814] can be used Mode Analog speed. Torque command offset Not used Applied [PC-813] Applied [PC-813] &, [PC-814] 						

4.2.7 I/O Contacts Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

MENU			Unit	Init INI Description			
Com	CODE	NAME	Min	Max	Description	wode	
			[10pulse]	10	Set output range of inposition.	Ρ	
100	PE-501	Inposition	1	60000	Pulse counter Com. Pulse counter Follow pulse counter RNG of inposition [PE-501] Output inposition - When the error pulse between commanded pulse and following pulse is within setting range, Inposition signal is output		
			[(a)]		※ Applied Setting value * 10 Pulse.		
			[10pulse]	90000	Set the range of position operation following	Р	
101	PE-502	Following Error	1	60000	 error signal. Pulse Counter Com. CNT. Error RNG Follow CNT Follow error When Error pulse is bigger than range of following error pulse, Alarm signal is output. * Applied Setting value * 10 Pulse. 		

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			[r/min]	10	Set output range of Zero Speed.					
102	PE-503	Zero Speed RNG	0.0	6000	Zero Speed RNG[PE-503] - Current speed is lower than setting value (ZSPD), signal is output.					
			[r/min]	100	Set the range of insped .					
103	PE-504	Inspeed	0.0	500	SPD Com. SPD Inspeed RNG [PE-504] INSPD - Gap between current speed and commanded speed is within setting value, the signal is output.					
			[r/min]	50	Set speed of brake operation signal output.	PST				
104	PE-505	Brake SPD	0.0	6000	SVOFF or Alarm Brake signal output SPD[PE-505] T Brake Output SVON In Brake Output CLess 55[msec] SVON In Brake Output CLess 55[msec] CHARK Signal output Delayed T [PE-506] CHARK Signal output Delayed T [PE-506] CHARK Signal output Speed[PE-505] or Brake signal output Speed[PE-505] or Brake signal output delayed time[PE-506]					

			[ms]	10	Set Brake operating signal output delayed time					
105	PE-506	Brake On Delay Time	0	1000						
			_	1	Set reset	PST				
106	106 PE-507 PowerFail		0	1	Mode 0	Type Manual reset Auto reset				
			_	0	Select out	tput contacts for Ready/Brake.	PST			
107	PE-508	Ready / Brake Select	0	1	Mode 0 1	Output contact type Ready output Brake output				
			-	1	Set Positio	on pulse clear mode.	Ρ			
108	PE-509	Pulse Clear Mode	0	1	Mode Position Pulse clear mode type 0 Edge(off->on) 1 Level(on) - Stop the motor with clear input positi command					
			_	1	Set Numerator for divide ratio of encoder					
109	**PE-510	Pulse Output Numerator	1	16384	output pu - Divide f for seria - When s of drive, f ratio.					
			-	1	Set Deno	minator for divide ratio of encoder				
110	**PE-511	Pulse output Denominator	1	16384	 output pulse divide for less than 4096[pulse] is available for serial encoder. When send encoder pulse as output signal of drive, the output pulse is sent with divided ratio. 					

		Pulse Output A / B Lead	_	0	Set Encoder output pulse (A/B phase).							
111	**PE-512		0	1	Mo	ode 0	de Output type of A / B phase A상 Lead B상 Lead					
			_	1	Set output ty		t type of serial encoder Z phase.					
112	PE-513	Pulse Output Z	0	1	Mode 0 1		odeEncoder Z phase output typeOA Phase half cycle1A Phase one cycle					
			_	0	Set di	rectior	n S/W.					S
113	PE-514	Dir Select Mode	0	1	Set 0 1	DIR OFF OFF	CW STOP OFF ON	Dperatii DIR ON ON	on Meth CW STOP OFF OFF	od ST DIR X ON OFF	OP STOP ON ON OFF	
			_	001	Set logic of output contacts.							PST
114	*PE-515	Output Logic	000	111	- Set output contacts logic from CN1 I/O. Output 2 1 0 1 0 1 0 1 $0INI : 0 1 2ALARM READY / BRAKE INSPDSelected by [PE-508] /INPOS$						I/O. 0 1 0 1 2 NSPD NPOS	
			[ms]	0	Set delayed time to be actual PWM-OFF from	PST						
-----	---------	------------------	-------	-------	---	-----						
115	PE-516	PWM off Delay	10	1000	Servo OFF. - With "BRAKE" output contacts signal, compensate the preparation time of brake operation, Delay the PWM signal. prevent down operation of motor at vertical application.							
			_	01100	Set Logic input contacts 0~4.							
116	*PE-517	Intput 0~4 Logic	00000	11111	Input: 4 3 2 1 0 $\downarrow \downarrow $							
			_	0000	Set logic for Input contacts 5~8.							
117	*PE-518	Intput 5~8 Logic	0000	1111	Input: $\begin{bmatrix} 8 & 7 & 6 & 5 \\ \hline & & 0 & 0 & 0 & 0 \\ \hline & & 0 & 0 & 0 & 0 \\ \hline \\$							

118	PE-519	ZSPD Gain Rate	[%]	 50 Stop vibration can be reduced at lower speed of [PE-303](Zero speed gain), with applying of stop vibration[PE-519] which is occurred bt big gain. But When rate is small, power of motor is decreased and response speed is also decreased at lower speed of Zero speed Gair [PE-313]. * Not operated when [PE-313](Zero speed gain) is 0 0 Set Gain 1, Gain 2 mode 				
119	*PE-520	Gain Conv Mode	0	1	Set Gain 1, Gain 2 mode Set Operation 0 Apply 1 gain between Speed or Position 1). Speed Mode [PE-601] : 1 a. Current speed is less than [PE- 313]01ōI : Applied Speed Gain 1 b. Current speed is over than [PE- 313] : Applied Speed gain 2 1 a. Current speed ≤ [PE-601] : 2 a. Current speed ≤ [PE-601] : 1 a. Current speed ≤ [PE-313] : Applied Speed control Gain 1 b. Current speed ≥ [PE-313] : Applied Speed control Gain 2 c. Error Pulse ≤ [PE-306] : Applied Position control Gain 1 d. Error Pulse ≥ [PE-319] : Applied Position control Gain 2			

4.2.8 Speed Operation Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

	MENU			INI		Description						
Com	CODE	NAME	Min	Max	Description							
				1	Set Op	erati	on Mode. (re	efer to chapt	er 4.4.5)	PST		
					Mode		Mode	Mode of	contacts			
							_	OFF	ON			
					0		Torque	X	X			
					1		Speed	X	X			
					2		Position	X	Х			
120	*PE-601	Operation Mode			3	Sp	eed/Position	Position	Speed			
120			0	5	4	Sp	beed/Torque	Torque	Speed			
					5	Pos	sition/Torque	Torque	Position			
					* Whe - Eve improv [PE-32 applied	 When mode is 3, 4 Even though [PE-320](0SPD torque improved) is set as "1" under mode no. 3,4, [PE-320](0SPD torque improved) is not applied. 						
121	PE-602	Speed	[r/min]	200	Speed	com	imand input	contacts is	defined by	ST		
121	1 2 002	Command1	-6000	6000	the cor	nbin	ation of SPE	ED1 / SPEE	D2.			
122	PE-603	Speed	[r/min]	1000						ST		
		Command2	-6000	6000	SPD	1	SPD2	속도	지령			
			[r/min]	3000	OFf	=	OFF	Analog spee	ed com.	ST		
					ON		OFF	Digital spee	d com.1			
					OFf	=	ON	Digital spee	d com.2			
123	PF-604	Speed			ON		ON	Digital spee	d com.3			
120	1 2 001	Command3	-6000	6000								
					 SPD1, 2 contacts is used as speed under the torque mode. 				speed limit			
124	PE-605	Not Used			-							
125	PE-606	Not Used										

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			[r/min]	10	Set speed for encoder Z phase search	S
100		Z Search			operation.	
126	PE-607	Operation Speed	1	300		
					- Setting value for operation of [PC-806].	
		Manual Resition	[r/min]	500	Set speed for manual position operation	S
127	PE-608		4	6000		
		Operation Speed	Γ	0000	- Setting value for operation of [PC-807].	
			[ms]	0	Set Aecel time of speed command.	S
128	PE-600	Accol Timo				
120	1 2 003	Accel fille	0	10000	- Set lead time of Decel from rated speed to	
					Zero Speed. And Unit is [ms].	
			[ms]	0	Set Decel time of speed command.	S
129	PE-610	Decel Time				
120			0	10000	- Set lead time of Decel from rated speed to	
					Zero Speed. And Unit is [ms].	
			_	0	Set S type control under Speed mode.	S
					- For smooth operation for Accel/Decel , S	
					type control can be set under Speed Mode.	
					- Straight type / S type Accel/Decel	
					Mode Function of Input contacts 6	
					0 Straight type Accel/Decel	
					1 S type Accel/Decel	
					- Accel/Decel Pattern as followed setting	
120		S Tupo Control			command	
130	*PE-011	S Type Control	0	1		
					PE-609 PE-610 PE-611 Com. Accel/Decel com.	
					0 0 0	
					Accel 0 0	
					0 Decel 0	
					Accel Decel 0	
					Accel 0 1	
					0 Decel 1	
					Accel Decel 1	

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121	DE-612	Tast Pup Spood0	[r/min]	100.0	Set speed 0 for continuous test operation	PST
101	FL UIZ	rest hun speedo	-6000	+6000		
100		Toot Dup Spood1	[r/min]	-500.0	Set apond 1 for continuous test operation	PST
132	PE-013	rest run speed i	-6000	+6000	Set speed 1 for continuous test operation	
133	PE-61/	Tast Run Spood?	[r/min]	1000.0	Set speed 2 for continuous test operation	PST
100		rest nun opeeuz	-6000	+6000		
13/	PE-615	Tast Run Spood3	[r/min]	-2000.0	Set speed 3 for continuous test operation	PST
104	FL 015	rest nun opeedo	-6000	+6000	Set speed 5 for continuous test operation	
135	PE-616	Tast Run Timol	[s]	5	Set time 0 for continuous test operation	PST
100	FL 010		1	3600		
136	PE-617	Tast Run Tima1	[s]	5	Catting 1 for continuous test or cretion	
100			1	3600		
127	DE-618	Tost Pup Timo?	[s]	5	Set time 2 for continuous test operation	PST
137	FE-010	rest null fillez	1	3600		
138	PE-610	Tast Run Tima3	[s]	5	Set time 3 for continuous test operation	PST
100			1	3600		
			—	1	Set output type of INSPD output contacts.	S
139	PE-620	Inspeed Type	0	1	ModeOutput type of INSPD output contacts0Zero Speed output	
					1 Accord speed output	

4.2.9 Potion Operation Variables Setting Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

	MENU			INI	Description							Model
Com	CODE	NAME	Min	Max	Description						NOUEI	
			_	1	Set Logic of position input pulse.							Ρ
140	*PE-701	Pulse Logic	0	5	- Type o rotation d PF +PR A Phase +B Phase CCW or CW Pulse Pulse + Dir	f position irection for N-Lo Forward 0 -Forward 1 - 1 2 - 2 - 2	commar or each lc ogic Reverse	nd ogic 3 4 5		t pu -Log vard 	Ise and gic Reverse ALAL ALAL	
			_	1000	Set Nume	rator/Den	ominator	foi	r eleo	ctror	nic gear	
141	*PE-702	Electric Gear N0	1	30000	ratio 0, 1,	2, 3.					C	
	55 700		_	1000								
142	*PE-703	Electric Gear DU	1	30000	E-GEAR1	E-GEAR2	E-gea	r rati	io	E	-gear Datio	
1/3	*PE-704	Electric Gear N1	_	1000]		E-gear ra	utio l	10	ſ		
140	~1 L 704		1	30000	OFF	OFF	E-gear ra	atio (0	E-ge	ear ratio 0	
144	*PE-705	Electric Gear D1	_	2000			E-gear ra	atio I	N 1			
			1	30000	ON	OFF	E-gear ra	atio (D1	E-ge	ear ratio 1	
145	*PE-706	Electric Gear N2	_	1000	0.55	0.11	E-gear ra	atio I	٧2	_		
			1	30000	OFF	ON	E-gear ra	atio (2	E-ge	ear ratio 2	Ρ
146	*PE-707	Electric Gear D2	_	3000			E-gear ra	atio I	13		oor rotio 0	
			1	30000		ON	E-gear ra	atio (03	∟-ye		
147	*PE-708	Electric Gear N3	-	1000								
			-	4000								
				4000	– Electric	; gear rat	io is dis	pla	yed	the	relation	
148	*PE-709	Electric Gear D3	1	30000	between motor e interpolati prevent p	position incoder ion) as osition op	commano pulse(Aff Numerato eration e	d i ter or/(rro	nput 4 Denc r.	tim tim	se and nes of ator to	
149	PE-710	Not used										

Chapter 4 Program Menu

			_	0	Set E-Gear Mode.		Ρ
150	PE-711	E-Gear Mode	0	1	Mode 0 Select 1 Offset Nume	Function t E-gear ratio 0~3 t override function to rator 0 of E-gear ratio	
			_	0	Set offset value for	r E-gear ratio Numerator 0.	Ρ
151	PE-712	E-Gear offset	-30000	30000	Mode Applied offset value at once once EGEAR1 contacts LOW → HIGH EGEAR2 contacts LOW → HIGH	Function Set offset value to E- gear N as setting offset value. Increase setting E-gear ratio N0 value at [PE-712] with amount of "1". Decrease setting E-gear ratio N0 value at [PE-712] with amount of "1".	
			_	0	Set direction of po	sition pulse.	Ρ
152	*PE-713	Pulse Dir	0	1	Mode 0 Comm 1 Oppos	Direction nanded direction site direction of command	
			[ms]	0	Set position comm	and Accel/Decel time.	Ρ
153	**PE-714	Position Pulse Accel/Decel Time	0	100	 Position pulse Accel/Decel time make smooth operation for rapid change of position command with setting the Time constant of 1st. delayed filter. Unit of position command Accel/decal setting range is 1[ms] and the Max. is 100[ms]. 		
154	PE-715	Not Used	_	_			
			_				
155	PE-716	Not Used	_	_			

			[turn]	10.00	Set target position(distance) as no. of rotation for manual position operation[PC-807].	PST	
156	56 PE-717 Manua Position Operation distance 0.00 300.00 [Le **		 The direction of operation is decided by [Left], [Right] under [PC-807] Menu **This menu is setting value for operation of PC-807. 				
			_	0	Set function of Limit contacts CCWLIM,	Ρ	
157	PE-718	Position Limit Pulse Clear	0	1	Mo Function 0 Pulse command is Clear. 1 Pulse command is counted. -under CCWLIM, CWLIM condition, when input pulse command counter is bigger than setting value of [PE-502](position operation following error range), AL-06(Following Error) is displayed.		
158	*PE-710	ABS Multi Turp	[2^]	16	Display Multi Turn Data of ABS encoder.	PST	
130	^1 L /19		10	16			
150	*DE_700	APS Single Ture	[2^]	17	Display Single Turn data of ABS encoder.	PST	
129	***=120	ADS SINGLE LUM	10	17			

4.2.10 Operation Menu

"**" Editing is not allowed under Servo-On & Reset Menu, "*" Editing is not allowed under Servo-On.

	MENU		Unit	INI	Description				
Com	CODE	NAME	Min	Max	Description				
			_	-	Alarm reset with display of				
160	PC-801	Alarm Reset	-	_	"CLEAr", after pressing [Enter].				
			-	_	Alarm history ([PA-101] \sim [PA-120]) is clear with				
161	PC-802	Alarm His Clear	_	_	display of "CLEAr" after pressing [Enter].				
			[r/min]	_	Manual Test operation.				
162	PC-803	Manual Test Run	-Min	Max	StepKEYDescription1[Enter]Display test operation speed (PE-602).2[Up]Display [PE-602]~[PE-604] stepwise. *Display absolute value of speed.3[Right]Motor is operated with forward Dir.4[Left]Motor is operated with reverse Dir.5[Enter]Return to Menu.**When press[Enter]				
					is displayed				
			[r/min]	_	Start continuous test operation.				
					Step KEY Description				
					1 [Enter] Move to 0~3 automatically.				
					Step Speed Time				
					0 PE-612 PE-616				
163	PC-804	Auto Test Run	Min	Ман	1 PE-613 PE-617				
			-1/11/1	-wax	2 PE-614 PE-618				
					3 PE-615 PE-619				
					2 [Enter] Return to Menu.				
					 When press [Enter] under Alarm condition, 'Err1' is displayed 				



			_	2.0	Start auto tuning operation. (Under devel	oping)		
					Step KEY Description	1		
					1 [Enter] Display inertia			
					2 [Up] Gain tuning starting with 1	00rpm		
					Press [Up] key, speed	is increased		
		Cain Tuna Pun			5 [00] 100->300->500rpm으를	≧ 200rpm.		
164	PC-805	Gain rune hun	1	50	4 [Right] Increase time of repeat	operation		
					5 [Left] Decrease time of repea	t operation		
					6 Tuning value is stable => 1	-inish tuning		
					7 [Enter] Save PE-301,307,309, ret	urn Menu		
					When press [Enter] under Alarm co	ndition, 'Err1'		
					s displayed.			
			[turn]	0.00	Start Z signal search operation with set	ting speed at		
					[PE-607].			
					Step KEY Description			
					1 [Enter] Enter [Mode] or Rele	ase [Mode]		
	PC-806	Z POS Search	0	9.99	[Left] [Left] is CW,[Right]	is CCW		
165					or [Right]			
					3 [Enter] Return to Menu			
					When CCWLIMIT, CWLIMIT contacts is OFF at	start time, this is		
					not operated. Not applied CCWLIMIT, CWLIMIT	contact during		
					operating time.			
					When press [Enter] under Alarm condition, 'Err'	' is displayed.		
			[turn]	-	Nove to Setting target position [PE-717	'] with setting		
					speed [PE-608].			
					Step KEY Description			
					1 [Enter] Enter [Mode] or Rele	ase [Mode]		
					[Left] [Left] is CW,[Right]	is CCW		
					or [Right]			
166	PC-807	Manual Position			3 [Up] Function for Start & F	^o ause		
		Run	_	-	4 [Enter] Return to Menu			
					When CCWLIMIT, CWLIMIT contacts is OFF at	start time, this is		
					not operated. Not applied CCWLIMIT, CWLIMIT	contact during		
					operating time.			
					When press [Enter] under Alarm conc	lition, 'Err1' is		
					displayed.			

Chapter 4 Program Menu

			_	_	Set for	ced ON/C	FF of output contact temporarily.
					l		
					Step	KEY	Description
					1	[Right]	Increase out0→out1→out2
					2	[Left]	Decrease out2→out1→out0
					3	[Up]	Change outx-L ↔ outx-H
					4	[Enter]	Return to Menu
					-Consi	ist of outp	ut contacts [Pd-016]
167	PC-808	Output Test	_	_	A		
					[Outo	ut contac	ts : Down]
					A	: out0	B : out1 C : out2
					A	LARM	READY/ BRAKE INSPD / INPOS
					× Th	e contact	s of out0, 1, 2 are same as A. B, C.
					≫ With	n this para	meter, can check the wiring condition
					betwee	en servo o	utput contacts and upper controller.
			_	-	Initializ	e the mer	u to shipping condition.
					Step	KEY	Description
					1	[Enter]	Display CLEAr
					2	[Left] or [Right]	Return to Menu without initialization
					3		Initialize with display of ALL-CL, then
					5	[00]	return to Menu automatically.
168	*PC-809	Menu data Init	_	_			
					* Dor	n't change	[PE-201] ~ [PE-220]
					* Pow	ver must t	urn ott/on again.
					* Wh	en applie	d [PC-809], after blackout Menu
					uala in	manzation	[LC-003] is must be needed

			_	_	Applied	d Menu Lo	ocking Function.
169	PC-810	Menu data Lock			Step	KEY	Description
105	10 010	Mend data Look	-	—	1	[Entor]	Don't edit any menu when
						[Linter]	Lock/unLock function is applied.
					* Loc	k display	: Lock, Unlock display: unlock
			—	_	Reset	Absolute	encoder.
170	PC-811	ABS Encoder set	_	_	Step	KEY	Description
					1	[Enter]	Reset Absolute encoder after
							displaying "reset" for 5 Sec.
			[mA]	_	Compe	ensate cu	rrent offset of Hall-CT.
					Step	KEY	Description
					1	[Enter]	Enter [mode] & return Menu
	PC-812	Current Offset			2	[Right]	Display offset of U phase
171		Save	_	_	3	[Left]	Display offset of V phase
					4	[aU]	Offset value of U, V is saved at
						L - - J	PE-219, 220 then return to Menu
					≫ Afte	er checki	ng offset, if press [Enter], return to
					Menu v	without sa	aving.
			[mV]	-	Save o	offset data	a of analog speed command voltage to
					[PE-4	02].	
					Step	KEY	Description
					1	[Enter]	Display current analog speed command
							Save displayed value as offset of
		Analog Speed			2	[Up]	analog speed command voltage to
172	PC-813	Cmd Offset	-1000	1000			[PE-402]
					3	[Enter]	Return Menu without offset value saving
					≫ Afte	er checki	ng offset, if press [Enter], return to
					Menu v	without sa	aving
					X App	olied this	parameter when [PE-420] is 1 or 3

			[mV]	-	Save o	offset of	analog torque command voltage to	
					[PE-40	07] autom	atically.	
					Step	KEY	Description	
					1	[Enter]	Display current analog torque command voltage.	
173	PC-814	Analog Torque Cmd Offset	-1000	1000	2	[Up]	Save the displayed value of analog torque command voltage as Offset Data to [PE-407]	
					4	[Enter]	Return menu without saving of offset value.	
					% if wthe value% Ava	vant to ch ue, press ilable, Wh	neck offset value only without saving [Enter]. en 2 or 3 of [PE-420] is set	
			[%]	_	Display	v Max Ioac	I ratio.	
		Maximum Load	-300	300	Step	KEY	Description	
					1	[Enter]	At first 00000 is displayed	
					2	[Right]	Display Max. Load for forward Dir.	
174					3	[Left]	Display Max. Load for Reverse. Dir.	
1/4	PC-815				4	[Up]	Clear displayed load rate. (current displayed value is value of before clear)	
						[Left]		
					5	or [Right]	Check Max. load after clear	
					6	[Enter]	Return to Menu	
			[pulse]	_	Display	r following	position pulse.	
					Step	KEY	설명	
					1	[Enter]	At first 00000 is displayed	
175	PC-816	Feedback Pulse	9.9.9.9.9.9	999999	999999	2	[Up]	Clear displayed following position pulse.
					3	[Enter]	Return to menu.	
					× '.' ۱	Means rev	ersed direction.	

176							
177							
			-	—			
178			_	_			
170			-	-			
			_	_	Initialize	all menu d	data to O/S download value.
					Step	KEY	Description
					1	[Enter]	Enter Mode
				ļ	0		Initialized with display of "ALL-
179	*PC-820	All Menu Data Init	_	_	2	[00]	CL" then return to Menu
					* This	paramet	er initialize all condition to O/S
					download	d default v	value, so the parameter which is set
					before sh	nipment ir	n needed to set again.
					(Caution)	Don't s	et as maker's setting menu



Chapter 5

Operation

5.1 Check items before operation

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5.1 Check items before operation

Check the below to avoid the accident and breakage of the product.

5.1.1 Wiring

- (1) Check if the proper voltage(AC200[V]) was applied to the power input terminal
- (2) Check if the power cables (U,V,W ground) between a drive and a motor are connected correctly
- (3) Check if the voltage 24[V] is connected to the control signal properly
- (4) Check if the regenerative resistor is proper capacity with good connection
- (5) Check if the wiring cable is curved severely or excessive pressure is applied
- (6) Check if the status of ground and shield are OK

5.1.2 Operating signal (CN1) wiring

Refer to the below for the status of wiring of operating signal and contact points

Pin No.	Pin name	Status of contact points	Pin No.	Pin name	Status of contact points
30	SVON	OFF	35	STOP	OFF
31	CCWLIM	ON	32	CWLIM	ON

Note) The name of signal can be different depending on the operation mode

5.1.3 Working circumstances

Check if there is metal dust or moisture in the wiring part

5.1.4 The conditions of machine

- (1) Check if the coupling of servo motor is OK
- (2) Check if the connected bolts are loosen or detached
- (3) Check if there is obstacle in the driving area

5.1.5 Menu variables

- (1) Check the motor ID setting [PE-201]
- (2) Check the encoder setting [PE-204]
- (3) Check if control gain [PE-301], [PE-302], [PE-307], [PE-309] are set properly

5.2 Operation

5.2.1 Alarm reset

- Contact points alarm reset : If you turn the driving signal (CN1) 'ALMRST' "ON", the status of alarm will be reset and become to normal condition.
- Operation menu rest: If you press [Enter] at alarm rest menu [PC-801], "CLEAr" will be displayed and alarm will be reset and become to normal condition
 - * If the alarm still remains even after reset, check the factors and remove the main causes, then try it again.

5.2.2 Alarm history clear

If you press [Enter] at alarm history menu [PC-802], "CLEAr" will be displayed and the alarm history will be cleared

(Note) 20pcs of alarm history is saved in serial from the recent one at [PA-101]to [PA-120]

5.2.3 Menu reset

If you press [Up] after pressing [Enter] at [PC-809], every variables will be changed into the initial values except the valuables on system [PE-201]~[PE-220]

(Note) You have to apply the power after turning off the power to change the variables into the initial one

5.2.4 Menu lock

If you press [Enter] at [PC-810], "Lock" will be displayed. When you try to edit menu data, the manipulation will be prohibited with "Err3" message. To clear it, if you press [Enter] one more time at [PC-810], the status of Menu Lock will be cleared with "unLock" message

5.2.5 Setting input contact point logic

You can set the status of input contact point at 0~4 logic setting menu [PE-517], 5~8 logic setting menu [PE-518].

[PE-517]: Setting input contact points 0~6 logic



[PE-518] Setting input contact points 5~8 logic



The input contact point is displayed as below

No.	0	1	2	3	4	5	6	7	8
Contact point	SVON	ALMRST	CCWLIM	CWLIM	STOP	DIR	MODE/ TRQLIM	SPD1 / EGEAR 1	SPD2 / EGEAR 2

Select the position of the input contact points by operating [Left] and [Right] key and set 0 or 1 by pressing [Up] key.

"0" : CN1 driving signal is operated through Normal A contact point

"1" : CN1 driving signal is operated through Normal B contact point.

Note) If you repeat to turn on/off the power, the fixed input contact points will remain in the same way as before

5.2.6 Setting output contact point logic

You can set the status of output contact point logic at output contact point 0~2 logic setting menu [PE-515].

[PE-515] : Setting output contact point 0~2



The output contact point logic is displayed as below.

0	1	2
ALARM	READY / BRAKE	INSPD / INPOS
	It can be selected	
	at [PE-508]	

Select the position of output contact point by manipulating [Left] & [Right] key and set 0 or 1 by pressing [Up] key.

"0" : CN1 driving signal is operated through Normal A contact point

"1" : CN1 driving signal is operated through Normal B contact point

Note) If you repeat to turn on/off the power, the fixed input contact points will remain in the same way as before



5.2.7 Setting forced ON/OFF of output contacts logic

You can check if the output point of servo is connected to the upper controller properly by using the function, forced ON/OFF of output contacts logic

If you press [Enter] at forced ON/OFF of output contacts logic setting menu, "out1-L" will be displayed. When you select the position of output contact point by manipulating [Left] & [Right] key and press [Up] key, it will be changed into "out1-H" and you can alter the logic status of output points temporarily.

Refer to the below for key function and display of output points.

KEY	Description
[Right]	out0 \rightarrow out1 \rightarrow out2 \rightarrow out0 moving into increase direction
[Left]	out2 \rightarrow out1 \rightarrow out0 \rightarrow out2 moving into decrease direction
[Up]	outx-L ↔ outx-changed into H
[Enter]	Return to menu

- The function of [Right], [Left], [Up], [Enter]

- Display and the kinds of output points

	out0	out1	out2
A	LARM	READY / BRAKE	INSPD / INPOS
		It can be selected at	
		[PE-508]	

* The contact points which come under out0, out1, out2 are same as the status of input/output contact points, A, B, C displayed at [Pd-016]

- [Pd-016] : Displaying the status of input/output



When you select the output contact point by manipulating [Left]& [Right] key and press [Up] key, the output contact point will be changed like L \leftrightarrow H

"outx-L": The contact point is OFF "outx-H": The contact point is ON

Note) If you turn ON/OFF the power, it will be returned to the initial status which was set at [PE-515]

5.3 Adjustment

5.3.1 Adjusting current offset

When you adjust the offset of internal current sensor which is installed in servo drive, you are requested not to adjust the offset value which was set initially. If you have wrong value, the control of servo will be unstable.

In case of download or S/W upload, you should set offset.

- How to adjust offset
 - 1 Turn ON the power of servo
 - ② SVOFF after continuous operation/stop under SVON or forward/backward operation for 10 seconds
 - 3 Turn OFF the power of servo and turn it ON
 - ④ When you press [Enter] key at [PC-812] and press [Right], [Left] key, the offset of U, V phase will be displayed.
 - (5) If you press [Up] key, the offset value will be saved and return to the menu.
 - 6 Repeat the step $\textcircled{2}{\sim}\textcircled{5}$ (about 5 times)
- If you press [Left], the offset value of U phase will be displayed and if you press, [Right] key, the offset of V phase will be displayed.

In case that there is too much difference among the values after turning ON/OFF the power, save the tuning vale by pressing [Up] key

⑧ If you press [Enter], it will return to the menu screen without saving the tuning value

5.3.2 Adjusting analog speed voltage offset

You can adjust the voltage offset of analog speed command automatically as below.

- ① Apply the voltage which standardizes the zero speed from upper controller
- ② Input 2 at [PE-420] to activate the automatic adjustment function for analog speed command offset.
- ③ When you press [Enter] key at [PC-813], the voltage of the current analog speed command will be displayed
- ④ The current value will be applied to the Offset data of analog speed command voltage
- (5) If you press [Up] key, the offset value will be saved at [PE-402] and return to the menu
- (6) The current offset voltage will be the standard of zero speed

5.3.3 Adjusting analog torque voltage offset

You can adjust the voltage offset of analog torque as below.

- ① Apply the voltage which standardizes the zero torque from upper controller
- ② Input 2 at [PE-420] to activate the automatic adjustment function for analog torque command offset.
- ③ When you press [Enter] key at [PC-813], the voltage of the current analog torque command will be displayed
- ④ The current value will be applied to the Offset data of analog torque command voltage
- (5) If you press [Up] key, the offset value will be saved at [PE-407] and return to the menu
- (6) The current offset voltage will be the standard of zero torque.

Note) Please be noted that the voltage offset of analog speed/torque are 0 initially. The adjustment should be preformed under Servo OFF and do not adjust it during operation

5.4 Test run

5.4.1 Hand operated run

- ① Press [Enter] key at [pc-803]
- ② Then, all alarm history will be cleared and the test run speed will be displayed. If the alarm is not cleared, try it again after checking the wiring and other factors of the alarm.

③ When you press[Up] key, the speed of test run has been changed.

The speed which is saved at [PE-602] \sim [PE-604] will be displayed in serial.

④ If you press [Left] key, the current speed will be displayed and the motor will be rotated in the reverse direction

(5) When you press [Right] key, the current speed will be displayed and the motor will be rotated in forward direction.

⑥ If you press [Enter] key, the test run will be terminated and return to the menu screen

5.4.2 Continuous test run

- (1) Set the operating speed and time for continuous test run at $[PE-612] \sim [PE-619]$
- 2 Press [Enter] key at [PC-804]
- ③ Then, every alarm will be cleared and servo will start to be operated. In case that the alarm is not cleared, try it again after checking the wiring and other factors of the alarm.
- (4) The operation step will be repeated continuously from 0 to 3 and you can set the operation speed and time at the below menu.

Step	Speed	Time
0	[PE-612]	[PE-616]
1	[PE-613]	[PE-617]
2	[PE-614]	[PE-618]
3	[PE-615]	[PE-619]

5.4.3 Z position run

- ① Set the speed for Z position run at [PE-607]
- 2 Press [Enter] key at [PC-806]
- ③ If you press [Left] key, the motor will be operated in CW direction and if you press [Right] key,
- it will be operated in CCW direction
- ④ If you press [Enter] key, it will return to menu.
- * This function is useful to assemble the position of Z phase.

5.4.4 Manual position operation

- ① Set the manual position operation speed at [PE-608] and set the no. of rotation at [PE-717]
- 2 Press [Enter] key at [PC-807]
- ③ Press [Left]-CW, [Right]-CCW to set the rotating direction
- If you press [Up] key, the motor will star to be operated. If you press [Up] key during rotation, it will be paused. The no. of rotation will be displayed.
- (5) If you press [Enter] key, it will return to menu after the motor stops
- When CCWLIMIT, CWLIMIT contacts is OFF at start time, this is not operated. Not applied CCWLIMIT, CWLIMIT contact for operating time.
- * The function is useful to convert the operation distance into the no. of rotation when you assemble the equipment



Product Specification

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6.1.1 Pro	oduct Features							
Servo Motor Moc	lel (APM-0000)	SAR3A	SAR5A	SA01A	SB01A	SB02A	SB04A	
Applicable driv	re (APD-000)		VN	101		VN02	VN04	
Rated Output	[kW]	0.03	0.05	0.1	0.1	0.2	0.4	
Potod Torquo	[N·m]	0.095	0.159	0.318	0.318	0.637	1.274	
Haled Torque	[kgf·cm]	0.97	1.62	3.25	3.25	6.50	13.0	
Maximum Instantaneous	[N·m]	0.286	0.477	0.955	0.955	1.912	3.822	
Torque	[kgf⋅cm]	2.92	4.87	9.74	9.74	19.5	39.0	
Rated rpm	[r/min]			3,0	000			
Maximum rpm	[r/min]			5,0	000	0.114 0.182 0.321		
la entire	[kg·m ² x10 ⁻⁴]	0.011	0.021	0.045	0.114	0.182	0.321	
inertia	[gf·cm·s ²]	0.0112	0.0214	0.0459	0.116	0.186	0.327	
Allowable load inertia ratio		30 tim	nes of motor	inertia	20 tim	nes of motor i	nertia	
Rated power rate	[kW/s]	5.57	10.52	23.80	8.92	22.26	50.65	
Speed/Position	Standard	Increi	mental 2,048	[P/R]	Increr	mental 2,500	[P/R]	
Detector	Option			Serial Inc. 1	7~21[bit]	2 22.26 50.65 Incremental 2,500[P/R] [bit]		
	Structure	Totally er	nclosed·Non ventil	ated IP55(Excludin	g the shaft-throug	gh section and cor	nectors)	
	Rated time			Contir	nuous			
Specification	Ambient temp			0~+4	0[° C]			
& Features	Ambient humidity			20~80[%](Av	void freezing))		
	Atmosphere	Avoi	d direct sunlight	, no corrosive ga	as, inflammable	gas, oil mist, or	dust	
	E/V		Elev	ation/Vibratio	on 49[m/s ²](5G)		
Weight	[kg]	0.3	0.4	0.52	0.84	1.11	1.63	



6-2 MECAPION

6.1 Servo Motor

Servo Motor Moc	lel (APM-0000)	SBN01A	SBN02A	SBN04A	SBN04A-BK	SC04A	SC06A	
Applicable driv	re (APD-000)	VN01	VN02		V	N04		
Rated Output	[kW]	0.1	0.2	0.4	0.4	0.4	0.6	
Deted Terrine	[N·m]	0.318	0.637	1.273	1.273	1.27	1.91	
Haled Torque	[kgf·cm]	3.25	6.49	12.99	12.99	13.0	19.5	
Maximum Instantaneous	[N·m]	0.955	1.910	3.82	3.82	3.82	5.34	
Torque	[kgf·cm]	9.74	19.48	38.96	38.96	39.0	54.5	
Rated rpm	[r/min]				3,000			
Maximum rpm	[r/min]				5,000			
Inartia	[kg⋅m ² x10 ⁻⁴]	0.014	0.182	0.322	0.254	0.674	1.092	
Inertia	[gf·cm·s ²]	0.116	0.186	0.328	0.259	0.687	1.114	
Allowable load inertia ratio			20 times of	motor ine	rtia	15 times of m	otor inertia	
Rated power rate	[kW/s]	8.91	22.22	50.41	63.84	24.07	33.45	
Speed/Position	Standard	Incremental 5[V] Line Drive 3,000[P/R] 2,500[P/R]						
Detector	Option			Serial Ir	nc. 17 ~ 21[bit]		
	Structure	Totally e	nclosed.Non ve	ntilated IP55(Ex	cluding the shaft-thr	ough section and cor	nnectors)	
	Rated time			С	Continuous			
Specification	Ambient temp			C	~+40[° C]			
& Features	Ambient humidity			20~80[%	6](Avoid freezir	ng)		
	Atmosphere	Avoi	d direct sunlig	ght, no corros	ive gas, inflammab	le gas, oil mist, or	dust	
	E/V		E	levation/Vil	oration 49[m/s ²	4 0.4 0.6 73 1.27 1.91 99 13.0 19.5 32 3.82 5.34 96 39.0 54.5 254 0.674 1.092 259 0.687 1.114 15 times of motor inertia 84 24.07 84 24.07 33.45 73 2,500[P/R] 21[bit] 2 e shaft-through section and connectors) us C] 4 freezing) nflammable gas, oil mist, or dust 49[m/s ²](5G) 63 1.85 2.49		
Weight	[kg]	0.84	1.11	1.63	1.63	1.85	2.49	



MECAPION 6-3

Servo Motor Mod	del (APM-0000)	SC08A SC10A SC03D SC05D SC06D SC07D						
Applicable driv	ve (APD-0000)	VN07	VN10	VN	104	VNC)7	
Rated Output	[kW]	0.8	1.0	0.3	0.45	0.55	0.65	
Deted Terring	[N·m]	2.55	3.19	1.43	2.15	2.63	3.09	
Hated Torque	[kgf·cm]	26.0	32.5	14.6	21.9	26.8	31.6	
Maximum	[N·m]	6.88	9.56	4.29	6.44	7.88	9.29	
Instantaneous Torque	[kgf·cm]	70.2	97.5	43.8	65.7	80.4	94.8	
Rated rpm	[r/min]	3,0	3,000 2,000					
Maximum rpm	[r/min]	5,000 3,000						
Inortio	[kg⋅m ² x10 ⁻⁴]	1.509	1.927	0.674	1.092	1.509	1.927	
mentia	[gf·cm·s ²]	1.539	1.966	0.687	1.114	1.539	1.966	
Allowable load inertia ratio				15 times of m	notor inertia			
Rated power rate	[kW/s]	43.02	52.65	30.36	42.19	43.68	47.90	
Speed/Position	Standard	Incren	nental 5[V] Li	ne Drive 2,500)[P/R]	2,500[P/R]	
Detector	Option			Serial Inc. 17	′ ~ 21[bit]			
	Structure	Totally e	enclosed.Non ventil	ated IP65(Excluding	the shaft-through	section and connec	tors)	
	Rated time			Contin	uous			
Specification	Ambient temp			0~+40	[°C]			
& Features	Ambient humidity		:	20~80[%](Avo	oid freezing)			
	Atmosphere	Avc	oid direct sunlight	, no corrosive gas	s, inflammable ga	s, oil mist, or dus	t	
	E/V		Elev	ation/Vibratio	n 49[m/s ²](50	G)		
Weight	[kg]	3.15	3.80	1.85	2.49	3.15	3.80	





6-4 меслио

Servo Motor Mode	el (APM-aaaaa)	SE09A SE15A SE22A SE30A SE06D SE11D						
Applicable drive	e (APD-0000)	VN10	VN15	VN20	VN35	VN07	VN10	
Rated Output	[kW]	0.9	1.5	2.2	3.0	0.6	1.1	
Data d Tanava	[N·m]	2.86	4.77	7.0	9.55	2.86	5.25	
Haled Torque	[kgf⋅cm]	29.2	48.7	71.4	97.4	29.2	53.6	
Maximum	[N·m]	8.59	14.32	21.01	28.65	8.59	15.75	
Torque	[kgf⋅cm]	87.7	146.1	214.3	292.2	87.7	160.7	
Rated rpm	[r/min]		З,	000		2,0	000	
Maximum rpm	[r/min]		5,000					
Inartia	[kg⋅m ² x10 ⁻⁴]	6.659	11.999	17.339	22.679	6.659	11.999	
inenia	[gf·cm·s ²]	6.792	12.238	17.685	23.132	6.792	12.238	
Allowable load inertia ratio				10 times of	motor inertia			
Rated power rate	[kW/s]	12.31	18.98	28.25	40.17	12.31	22.97	
Speed/Position	Standard		Incre	mental 5[V] L	ine Drive 3,000	D[P/R]		
Detector	Option			Serial Inc.	17~21[bit]			
	Structure	Total	y enclosed.Non ve	ntilated IP65(Exclud	ing the shaft-throug	h section and conn	ectors)	
	Rated time			Cont	inuous			
Specification	Ambient temp			0~+-	40[° C]			
& Features	Ambient humidity			20~80[%](A	void freezing)			
	Atmosphere	ere Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust						
	E/V		E	levation/Vibrat	ion 49[m/s ²](5G)		
Weight	[kg]	5.6	7.2	8.7	10.2	5.6	7.2	

♦ Speed-Torque characteristics ◆



Servo Motor Moc	lel (APM-0000)	SE16D SE22D SE03M SE06M SE09M SE12M					SE12M
Applicable driv	re (APD-000)	VN15	VN20	VN04	VN07	VN10	VN15
Rated Output	[kW]	1.6	2.2	0.3	0.6	0.9	1.2
Dated Targue	[N·m]	7.63	10.5	2.86	5.72	8.59	11.46
Rated Torque	[kgf·cm]	77.9	107.1	29.2	58.4	87.7	116.9
Maximum Instantaneous	[N·m]	22.92	31.51	8.59	17.18	25.77	34.22
Torque	[kgf⋅cm]	233.8	321.4	87.7	175.3	262.9	349.1
Rated rpm	[r/min]	2,000 1,000					
Maximum rpm	[r/min]	3,000 2,000					
Inortio	[kg⋅m ² x10 ⁻⁴]	17.339	22.679	6.659	11.999	17.339	22.679
mertia	[gf·cm·s ²]	17.685	23.132	6.792	12.238	17.685	23.132
Allowable load inertia ratio				10 times of	motor inertia		
Rated power rate	[kW/s]	33.63	48.61	12.31	27.34	42.56	57.85
Speed/Position	Standard		Increm	ental 5[V] Lir	ne Drive 3,00	0[P/R]	
Detector	Option			Serial Inc. 1	7~21[bit]		
	Structure	Totally er	nclosed·Non ventil	ated IP65(Excludir	ig the shaft-throug	gh section and co	nnectors)
	Rated time			Conti	nuous		
Specification	Ambient temp			0~+4	0[° C]		
& Features	Ambient humidity			20~80[%](Av	void freezing)	
	Atmosphere	Avoi	d direct sunlight	, no corrosive ga	as, inflammable	gas, oil mist, or	dust
	E/V		Elev	vation/Vibratio	on 49[m/s ²](5G)	
Weight	[kg]	8.7	10.2	5.6	7.2	8.7	10.2



6-6 MECAPION

Servo Motor Moc	lel (APM-0000)	SF30A SF22D SF35D SF12M SF20M SF30M					SF30M
Applicable driv	re (APD-000)	VN30	VN20	VN35	VN15	VN20	VN30
Rated Output	[kW]	3.0	2.2	3.5	1.2	2.0	3.0
Deted Terrine	[N·m]	9.55	10.5	16.7	11.46	19.09	28.64
Rated Torque	[kgf·cm]	97.4	107.1	170.4	116.9	194.8	292.2
Maximum Instantaneous	[N·m]	28.64	31.5	50.12	34.38	57.29	85.94
Torque	[kgf·cm]	292.2	321.3	511.3	350.7	584.4	876.6
Rated rpm	[r/min]	3,000	3,000 2,000 1000				
Maximum rpm	[r/min]	5,000	3,0	000	2000		
Inartia	[kg·m ² x10 ⁻⁴]	30.74	30.74	52.13	30.74	52.13	83.60
mertia	[gf·cm·s ²]	31.35	31.35	53.16	31.35	53.16	85.24
Allowable load inertia ratio				5 times of r	notor inertia		
Rated power rate	[kW/s]	29.66	35.88	53.56	42.70	69.96	98.16
Speed/Position	Standard		Increm	ental 5[V] Lir	ne Drive 3,00	0[P/R]	
Detector	Option			Serial Inc. 1	7~21[bit]		
	Structure	Totally er	nclosed·Non ventil	ated IP65(Excludir	g the shaft-throug	gh section and co	nnectors)
	Rated time			Conti	nuous		
Specification	Ambient temp			0~+4	0[° C]		
& Features	Ambient humidity			20~80[%](Av	void freezing))	
	Atmosphere	Avoi	d direct sunlight	, no corrosive ga	as, inflammable	gas, oil mist, or	dust
	E/V		Elev	vation/Vibratio	on 49[m/s ²](5G)	
Weight	[kg]	12.4	12.4	17.7	12.4	17.7	26.3





Servo Motor Moc	del (APM-0000)	SE05G SE09G SE13G SE17G SF20G SF30G					
Applicable driv	/e (APD-000)	VN07	VN10	VN15	VN	120	VN30
Rated Output	[kW]	0.45	0.85	1.3	1.7	1.8	2.9
Data d Tarava	[N·m]	2.86	5.41	8.27	10.82	11.45	18.46
Rated Torque	[kgf·cm]	29.22	55.19	84.41	110.38	116.88	188.3
Maximum Instantaneous	[N·m]	8.59	16.23	24.82	32.46	34.37	55.38
Torque	[kgf·cm]	87.66	165.57	253.23	331.14	350.6	564.9
Rated rpm	[r/min]	1,500					
Maximum rpm	[r/min]	3,000					
Inortio	[kg⋅m ² x10 ⁻⁴]	6.659	11.999	17.339	22.679	30.74	52.13
mentia	[gf·cm·s ²]	6.792	12.238	17.685	23.132	31.35	53.16
Allowable load inertia ratio			10 times of	motor inertia		5 times of r	notor inertia
Rated power rate	[kW/s]	12.28	24.39	39.54	51.61	42.70	65.36
Speed/Position	Standard		Increm	ental 5[V] Lir	ne Drive 3,00	0[P/R]	
Detector	Option			Serial Inc. 1	7~21[bit]		
	Structure	Totally er	nclosed.Non ventil	ated IP65(Excludin	ig the shaft-throug	gh section and co	nnectors)
	Rated time			Conti	nuous		
Specification	Ambient temp			0~+4	0[° C]		
& Features	Ambient humidity		:	20~80[%](Av	void freezing)	
	Atmosphere	Avoi	d direct sunlight	, no corrosive ga	as, inflammable	gas, oil mist, or	dust
	E/V		Elev	vation/Vibratio	on 49[m/s ²](5G)	
Weight	[kg]	5.6	7.2	8.7	10.2	12.4	17.7





Servo Motor Moc	del (APM-0000)	SG22D SG35D SG20G SG30G SG12M SG20M					SG20M
Applicable driv	/e (APD-000)	VN20	VN35	VN20	VN30	VN15	VN20
Rated Output	[kW]	2.2	3.5	1.8	2.9	1.2	2.0
Data d Tarava	[N·m]	10.5	16.7	11.5	18.5	11.5	19.1
Hated Torque	[kgf⋅cm]	107.2	170.5	116.9	188.4	116.9	194.9
Maximum Instantaneous	[N·m]	31.5	50.1	34.4	55.4	34.4	57.3
Torque	[kgf⋅cm]	321.5	511.5	350.8	565.1	350.8	584.6
Rated rpm	[r/min]	2,0	000	1,5	500	10	00
Maximum rpm	[r/min]	3000 3,000 2000				00	
Inortio	[kg⋅m ² x10 ⁻⁴]	51.42	80.35	51.42	80.35	51.42	80.35
mentia	[gf·cm·s ²]	52.47	81.99	52.47	81.99	52.47	81.99
Allowable load inertia ratio				5 times of n	notor inertia		
Rated power rate	[kW/s]	21.45	34.75	25.53	42.41	25.53	45.39
Speed/Position	Standard		Increm	ental 5[V] Lir	ne Drive 3,00	0[P/R]	
Detector	Option			Serial Inc. 1	7~21[bit]		
	Structure	Totally er	nclosed·Non ventila	ated IP65(Excludin	g the shaft-throug	gh section and co	nnectors)
	Rated time			Contir	nuous		
Specification	Ambient temp			0~+4	0[° C]		
& Features	Ambient humidity			20~80[%](Av	void freezing)	
	Atmosphere	Avoi	d direct sunlight	, no corrosive ga	as, inflammable	gas, oil mist, or	dust
	E/V		Elev	vation/Vibratio	on 49[m/s ²]((5G)	
Weight	[kg]	17.44	23.12	17.44	23.12	17.44	23.12





MECAPION 6-9

Servo Motor Model (APM-0000)	SG30M	M HB01A HB02A HB04A HE09A HE15A				
Applicable drive (AP	D-000)	VN30	VN01	VN02	VN04	VN10	VN15
Rated Output	[kW]	3.0	0.1	0.2	0.4	0.9	1.5
Deted Terrine	[N·m]	28.6	0.318	0.637	1.274	2.86	4.77
Haled Torque	[kgf⋅cm]	292.3	3.25	6.50	13.0	29.2	48.7
Maximum Instantaneous	[N·m]	85.9	0.955	1.912	3.822	8.59	14.32
Torque	[kgf⋅cm]	876.9	9.74	19.5	39.0	87.7	146.1
Rated rpm	[r/min]	1000			3000		
Maximum rpm	[r/min]	2000	5000				
Inortio	[kg⋅m ² x10 ⁻⁴]	132.41	0.269	0.333	0.461	19.558	22.268
mertia	[gf·cm·s ²]	135.11	0.274	0.339	0.470	19.943	22.707
Allowable load inertia ratio		5배	20 tim	nes of motor	inertia	10 times of	motor inertia
Rated power rate	[kW/s]	61.97	3.34	11.98	34.47	4.10	10.01
Speed/Position	Standard	Incre	mental 5V Lir	ne Driver 1,02	24P/R	2,048	3 P/R
Detector	Option			Serial Inc. 1	7~21[bit]		
	Structure	Totally er	nclosed·Non ventil	ated IP65(Excludir	g the shaft-throug	gh section and co	nnectors)
	Rated time			Conti	nuous		
Specification	Ambient temp			0~+4	0[° C]		
& Features	Ambient humidity			20~80[%](Av	void freezing))	
	Atmosphere	Avoi	d direct sunlight	, no corrosive ga	as, inflammable	gas, oil mist, or	dust
	E/V		Elev	vation/Vibratio	on 49[m/s ²]([5G)	
Weight	[kg]	31.82	0.89	1.16	1.69	5.82	7.43





6-10 меслио

Electronic Brake's Specification





Brake Type Servo Motor

Applicable Motor Series	APM-SA	APM-SB	APM-SC	APM-SE	APM-SF	APM-SG
001100						
Use	Maintenance	Maintenance	Maintenance	Maintenance	Maintenance	Maintenance
Power Supply [V]	DC 24V	DC 90V				
Rated Friction Torque [N•m]	0.32	1.47	3.23	9.2	40.2	74
Capacity [W]	6	6.5	9	7	33	25
Coil Resistance [Ω]	96	89	64	1150	245	327
Rated Current [A]	0.25	0.27	0.38	0.08	0.37	0.28
Braking type	Spring brake					
Insulation Class	F - class	F - class	F - class	F - class	F - class	F - class

- Note) 1. For the Electronic Brake that is attached to our Servo Motor, the same specifications are to be applied as per the series.
 - 2. Never use it for braking purpose because the electronic brake is only for maintenance of stopped condition.
 - 3. The characteristic of electronic brake is measured at 20°C.

6.1.2 External Dimensions6

◆ Standard type : APM-SAR3A, APM-SAR5A, APM-SA01A



Madal		Maight(kg)			
woder	L	LM	LC	СВ	vveight(kg)
SAR3A	104.5	79.5	44	52	0.3
SAR5A	111.5	86.5	51	59	0.4
SA01A	128.5	103.5	68	76	0.52

Note1) 40Flange's standard axis is straight.

◆ Brake-attached type : APM-SAR3A, APM-SAR5A, APM-SA01A



Pin No. Color Phase Red White U 00 30 Ŵ Black Plug :172167-1 (Made by AMP) <Connector Pin for Power Supply>

Pin No.	Color	Phase
1	Red	+
2	White	-

Plug :172165-1 (Made byAMP) <Brake Connector Pin>



<Encoder Connector Pin>

Madal		Waight(kg)			
woder	L	LM	LC	СВ	vveight(kg)
SAR3A	133.5	108.5	44	81	0.65
SAR5A	140.5	115.5	51	88	0.75
SA01A	157.5	132.5	68	105	0.87

Note1) 40Flange's standard axis is straight.

Note2) Use DC 24[V] for brake input power supply


Standard type : APM-SB01A, APM-SB02A, APM-SB04A



Madal		Waight(kg)			
woder	Model L		LC	СВ	vveight(kg)
SB01A	120.5	90.5	52.5	60.5	0.84
SB02A	134.5	104.5	66.5	74.5	1.11
SB04A	162.5	132.5	94.5	102.5	1.64

◆ Brake-attached type : APM-SB01A, APM-SB02A, APM-SB04A



Madal		Waight(kg)			
woder	L	LM	LC	СВ	vveight(kg)
SB01A	160.5	130.5	52.5	100.5	1.21
SB02A	174.5	144.5	66.5	114.5	1.49
SB04A	202.5	172.5	94.5	142.5	2.05

Note) Use DC 24[V] for brake input power supply.

♦ Standard type : APM-SC04A,SC03D, APM-SC06A,SC05D, SC08A,SC06D, SC10A,SC07D



	External dimensions						
Model	L	LM	LC	СВ	S	Weight(kg)	
SC04A,SC03D	158	118	79	86.5	14	1.85	
SC06A,SC05D	178	138	99	106.5	16	2.49	
SC08A,SC06D	198	158	119	126.5	16	3.15	
SC10A,SC07D	218	178	139	146.5	16	3.80	

Brake-attached type : APM-SC04A,SC03D,SC06A,SC05D,SC08A,SC06D,SC10A,SC07D



	External dimensions						
Model	L	LM	LC	СВ	S	Weight(kg)	
SC04A,SC03D	191	151	79	119.5	14	2.45	
SC06A,SC05D	211	171	99	139.5	16	3.09	
SC08A,SC06D	231	191	119	159.5	16	3.75	
SC10A,SC07D	251	211	139	179.5	16	4.40	

Note) Use DC 24[V] for brake input power supply.



Standard type : APM-SE09A,SE06D,SE05G,SE03M, APM-SE15A,SE11D,SE09G,SE06M APM-SE22A,SE16D,SE13G,SE09M, APM-SE30A,SE22D,SE17G,SE12M



Model		External o	dimensions	;	Key dimensions			Woight(kg)
MODEI	L	LM	LC	S	Т	W	U	weight(kg)
SE09A,SE06D,SE05G,SE03M	202	144	94	19	5	5	3	5.6
SE15A,SE11D,SE09G,SE06M	226	168	118	19	5	5	3	7.2
SE22A,SE16D,SE13G,SE09M	250	192	142	22	6	6	3.5	8.7
SE30A,SE22D,SE17G,SE12M	274	216	166	22	6	6	3.5	10.2

 Brake-attached type : APM-SE09A,SE06D,SE05G,SE03M, APM-SE15A,SE11D,SE09G,SE06M APM-SE22A,SE16D,SE13G,SE09M, APM-SE30A,SE22D,SE17G,SE12M



Model		External o	dimensions	;	Key dimensions			Maight(kg)
Widder	L	LM	LC	S	Т	W	U	weight(kg)
SE09A,SE06D,SE05G,SE03M	237	179	94	19	5	5	3	7.4
SE15A,SE11D,SE09G,SE06M	261	203	118	19	5	5	3	9.0
SE22A,SE16D,SE13G,SE09M	285	227	142	22	6	6	3.5	10.5
SE30A,SE22D,SE17G,SE12M	309	251	166	22	6	6	3.5	12.0

Note) Use DC 24 [V] for brake input power supply.

Standard type : APM-SF30A,SF22D,SF20G,SF12M, APM-SF50A,SF35D,SF30G,SF20M APM-SF55D,SF44G,SF30M, APM-SF75D,SF60G,SF44M



	E			
Model	L	LM	LC	Weight(kg)
SF30A,SF22D,SF20G,SF12M	261.8	182.8	132.8	12.4
SF50A,SF35D,SF30G,SF20M	294.8	215.8	165.8	17.7
SF55D,SF44G,SF30M	344.8	265.8	215.8	26.3
SF75D,SF60G,SF44M	404.8	325.8	275.8	35.6

Brake-attached type : APM-SF30A,SF22D,SF20G,SF12M, APM-SF50A,SF35D,SF30G,SF20M
 APM-SF55D,SF44G,SF30M, APM-SF75D,SF60G,SF44M



	E			
Model	L	LM	LC	Weight(Kg)
SF30A,SF22D,SF20G,SF12M	311.8	232.8	132.8	17.6
SF50A,SF35D,SF30G,SF20M	344.8	265.8	165.8	24.9
SF55D,SF44G,SF30M	394.8	315.8	215.8	33.5
SF75D,SF60G,SF44M	454.8	375.8	275.8	42.8

Note) Use DC 24[V] for brake input power supply, Eyebolt is used at over SF55D, SF44G, SF30M type



Standard type :APM-SG22D,SG20G,SG12M, APM-SG35D,SG30G,SG20M
 APM-SG55D,SG44G,SG30M, APM-SG75D,SG60G,SG44M



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Madal	E	M(a; a a + (x a))			
Wodel	L	LM	LC	14.2	
SG22D,SG20G,SG12M	237	172	122	14.2	
SG35D,SG30G,SG20M	257	192	142	19.88	
SG55D,SG44G,SG30M	293	228	178	28.56	
SG75D,SG60G,SG44M	321	256	206	37.28	

Brake-attached type : APM-SG22D,SG20G,SG12M, APM-SG35D,SG30G,SG20M APM-SG55D,SG44G,SG30M, APM-SG75D,SG60G,SG44M





Marial	E				
Model	L	LM	LC	weight(kg)	
SG22D,SG20G,SG12M	304	239	122	22.2	
SG35D,SG30G,SG20M	324	259	142	27.88	
SG55D,SG44G,SG30M	360	295	178	36.56	
SG75D,SG60G,SG44M	388	323	206	45.28	

Note) Use DC 90[V] for brake input power supply.

◆ APM-HB01A(Hollow shaft type), APM-HB02A(Hollow shaft type), APM-HB04A(Hollow shaft type)



Madal		Waight(Kg)					
woder	L	LM	LC	СВ	Hollow shaft type	weight(kg)	
HB01A	140.5	98.5	63.5	25	15	0.89	
HB02A	154.5	112.5	77.5	39	15	1.16	
HB04A	182.5	140.5	105.5	67	15	1.69	

◆ APM-HE09A(Hollow shaft type), APM-HE15A(Hollow shaft type)



Madal		Waight(Kg)			
Model	L	LM	LC	Hollow shaft type	weight(kg)
HE09A	207	150	111.5	50	5.82
HE15A	231	174	135.5	50	7.43

6.2 Servo Drive

6.2.1 Features

Item	Model	VN01	VN01 VN02 VN04 VN07 VN10 VN15 VN20 VN						VN35
Inpu	t voltage		3상	AC 200~2	230[V]+10	[%]-15[%]], 50/60[Hz]	
	Voltage type		3 F	hase sine	wave PWN	-driven AC	C Servo mo	otor	
Applicab le Motor	Rated current	1.4	1.65	3.0	4.3	6.4	11	16	21
	Max.current	4.2	4.95	9.0	12.9	19.2	33	48	63
Detect	tor system	Standard Ser	: Incremen ial Inc. 17	tal line driv ~ 21[bit]	ver 2000~1	0000 [P/R]		
	Speed control range	Max 1:5,	000						
	Frequency response	Max 400[Hz], Serial	: 600Hz					
Speed Control	Speed command	DC -10[V 3 speeds]~+10[V](Reverse	rotation in	case of m	inus voltag	je), digital	command
mode	Accleleration/ Deceleration time	Linear or Setting 1[S shape ao ms] unit is	celeration, possible	/deceleratio	on (0~100,	000[ms],		
	Speed variation ratio	±0.01[%]	or less [a	t Load varia	ation 0~10	0%], ±0.	1[%]or les	s[Temp.25	±10℃]
Desition	Input frequency	Line Drive Open Coll	:500[kpp ector:400	s])[kpps]					
Control	Input pulse type	A+B phase, forward and reverse pulse, direction + pulse[Line driver, Open collector]							
	Electrical gear ratio	Setting ar	id selecting	g 4 digital e	electronic (gear ratio.	Precise adj	justment is	possible.
Torque	Torque command input	DC -10[V]~+10[V][-Reverse	e rotation ir	n case of n	ninus volta	ge]	
Control Mode	Torque Linearity	2[%] or le	ess						
	Limit speed command	DC 0[V] -	~+10[V],	digital com	nmand 3 sp	eeds.			
	Generated braking	Standard	built in [O	perating at	servo alarr	n of servo	OFF]		
	Regenerate d braking	Op	tion	Stanc Attao	lard - ched	Pr	ovide stan	dard resist	or
Built In	Display	Built in 7–	Segments	[6Digits], (CHARGE &	ALARM La	mp		
Function	Monitor output	DC -5[V]	~ +5[V],	2 channels	[speed, to	orque, posi	tion, etc]		
	Protective functions	Overcurre voltage sl problem,	nt, overloa nortage, o UV current	ad, over cu verspeed, sensor pro	Irrent limit wrong wir oblem, mot	over, heate ing, encod or output p	ed power r er problen problem.	module, ov n, position	ervoltage, following
Ambient	Temp.	0 ~ 50[°C]						
Erviron-	Humidity	90[%] or	iess (avoid		ation)			1	
ment	ment Atmosphere Indoors, no corrosive gas, inflammable gas and fluid, oil mist, or dust								

6.2.2 External Dimensions ♦ APD-VN01~02N





★ Weight:0.8[kg]

♦ APD-VN04N





★ Weight:1.0[kg]

6.3 Option and Peripherals

Options(Cable)

Classification	Product name	Model(Note1)	Applicable motor	Specification
For Signal	Encoder Cable	APC-E000AS	All Models of APM-SA APM-SB APM-SC APM-HB Series	Motor side connectorDrive side connector(CN2)Image: ConnectorImage: ConnectorImage: ConnectorImage: ConnectorImage: ConnectorImage: Connector(CN2)Image: Connector(CN2)Image: Connector(CN2)Image: Connector Connector(CN2)Image: Connector(CN2)I
For Signal	Encoder Cable	APC-EBS	All Models of APM-SE APM-SF APM-SG APM-HE SERIES	Motor side connector 1. Motor side connector(MS:Military Standard) 1. PLUG : MS3108B(MS3106B) 20-29S 2. Drive side connector(CN2) 1. CASE : 10320-52A0-008(Made by 3M) 2. CONNECTOR : 10120-3000VE(Made by 3M) 3. Cable : 7Px0.2SQ(AWG24)

Note 1) $\square \square \square$ of Model No. indicates the kind and length of cable, and the declaration is as below.

Cable Length(m)	3	5	10	20
Robotic Cable	F03	F05	F10	F20
General Cable	N03	N05	N10	N20

Options(Cable)

Classification	Product name	Model(Note1)	Applicable motor	Specification
			All models of	Motor side connector Drive side connection
For Power supply	Standard Power Cable	APC-P-CS	APM-SA APM-SB APM-HB Series APM-SC04A APM-SC06A APM-SC05D APM-SC06D APM-SC07D	 I. Motor side connector 1. CAP (4 Position) : 172159-1(Made by AMP) 2) SOCKET : 170362-1(Made by AMP) 2. Drive side connector(U,V,W,FG) 1) PIN : UA-F1512(Made by Suh-il Electronic) 2) Compressor : UA-510A(Made by Suh-il) 3. Cable : 4Cx0.75SQ(AWG18) (For APM-SAR3A,SAR5A,SA01A, 0.5SQ is used.)
For Power supply	Brake type Power Cable	APC−P⊡⊡KB	All models of APM-SA APM-SB APM-SC SERIES	Motor side connector Drive side connection 1. Motor side connector 1) CAP (6 Position) : 172157-1(Made by AMP) 2) SOCKET : 170362-1(Made by AMP) 2. For power supply of Brake 1) Connection terminal : 1.25x3(KET GP110012) 2) Cable : 2Cx0.75SQ(AWG18)

Note 1) of Model No	. indicates the	kinds and l	length of	cable, and	declaration	is as	below.
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Cable Length(m)	3	5	10	20
Robotic Cable	F03	F05	F10	F20
General Cable	N03	N05	N10	N20

Options(Cable)

Classification	Product name	Model(Note1)	Applicable motor	Specifica	ation
For Power	Brake type	APC-	All Models of APM-SE	Motor side connector	Drive side connection
supply	Power Cable	PadamB	SERIES	 Motor side connector(MS PLUG : MS3108B(MS Drive side connection(U, Connection terminal : Cable : 4Cx2.0SQ(AW)	S : Military Standard) 3106B)20-15S V,W,FG) 2.5x4(KET GP110721) G14) side(+,-) 1.25x3(KET GP110012) VG18) or the drive connection side able.

Note 1) $\square \square \square$ of Model No. indicates the kinds and length of cable, and declaration is as below.

Cable Length(m)	3	5	10	20
Robotic Cable	F03	F05	F10	F20
General Cable	N03	N05	N10	N20

Options(Connector)

Classification	Product name	Model(Note1)	Applicable drive	Specification
For Signal	CN1 Cable	APC- CN100VNA	All Models of APD-VN SERIES	[Upper Controller] [Drive connection side CN1] Indicates Pin No. 1. Drive side connection(CN1) 1) CASE : 10336–52A0–008(Made by 3M) 2) CONNECTOR : 10136–3000VE(Made by 3M) 3) CABLE : BOW-SB0 1Cx36C(AWG 28)
				3) CABLE - HOW-SBU. TCXSOC(AWG 20)

Note) D Model No. indicates the Cable length, and declaration is as below.

Cable Length(m)	1	2	3	5
Declaration	01	02	03	05

Options(Connector)

Classification	Product name	Model(Note1)	Applicable drive	Specification
CN	CN1 Connector	APC-CN1NNA	All Models of APD-VN SERIES	19 19 19 10 10 18 1) CASE : 10336-52A0-008(Made by 3M)
CN	CN2 Connector	APC-CN2NNA	All Models of APD-VN SERIES	 2) CONNECTOR : 10136-3000VE(Made by 3M) 2) CONNECTOR : 10136-3000VE(Made by 3M) 1) CASE : 10320-52A0-008(Made by 3M) 2) CONNECTOR : 10120-3000VE(Made by 3M)

■ Options(I/O JIG)

Classification	Product name	Model(Note1)	Specification
I/O JIG	Standard type I/O JIG	APC-VSIONA	 Input Power supply : Single Phase AC220[V] I/O function of standard type(APD-VN) Servo Drive Cable length can be adjusted.

Note1) \square of Model No. indicates the cable length, and declaration is as below.

Cable Length(m)	1	2	3	5
Declaration	01	02	03	05

Chapter7

Maintenance and Inspection

7.1 Maintenance and Inspection

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7.1 Maintenance and Inspection

In the chapter, maintenance and inspection of servo motor and drive are explained.

7.1.1 Caution

- ① When checking motor voltage: As the voltage applied to the motor from the servo amplifier is PWM controlled, wave form of pulse phase is displayed. There may be significant difference in indicator value depending on types of meters, so be sure to check with rectification voltmeter for more detail inspection.
- ② When checking motor current: The pulse wave form is smoothed to sine wave to a certain degree by the motor reactance. Connect and use a moving-iron type ampere meter.
- ③ When checking power: Use an electrodynamics type 3-phase watt-meter
- ④ Other devices: When using oscilloscope or digital volt meter, please make sure that they should not be contacted to the ground. For input current, please use 1[mA] or less of current.

7.1.2 Inspection Items

Charged voltage may remain in the smoothing condenser creating an element of danger when inspecting drive. Turn off power and wait for approximately 10 minutes before starting inspection.

()Inspection of servo motor

Inspection items	Inspection period	Method	Remark
Vibration And noise	Every month	With the sense of touch and the sense of hearing.	It should not be big (serious) compared to the normal condition.
External appearance	According to Contamination And damage	Clean it up with fabric or air	_
Insulation Resistor	Once a year At least	Disconnect with drive, and measure resistor with 500V mugger tester. Normal is more than 10[M2]. <note1></note1>	If resistance is less than 10[MQ], inquire to service department
Change Oil seal	Once in 5,000 Hours at least	Detach from machine, and replace it.	Only for the motor which contains oil seal
Overall inspection	Once in 20,000 Hours or 5 years At least	Inquire to our service department	Customer is required not to disassemble the Servo motor and clean it by themselves.

(Note 1) Measure Between one of U, V, W and FG

② Followings are for maintaining Servo drive.

The Servo drive need not to be checked and maintained on a daily basis as it uses highly reliable parts, But check it at least once in a year.

Inspection item	Period	Check for	Solution
Main body and circuit board	Once a year at least	Dust, Oil	Clean up with air or cloths.
Terminal screws for looseness	Once a year at least	Screws for connection terminal and connector are securely tightened	Tighten it
Parts for defects on main body and circuit board	Once a year at least	Discoloration caused by heat, damage or disconnection	Inquire to our service department



7.1.3 Period of Replacing Parts

The following parts undergo aging process as time passes due to mechanical friction or the characteristics of the material used, leading to the deterioration of equipment performance or breakdown. Check the parts Periodically and replace them, of necessary.

① Smoothing

The characteristics become aged due to the effects of ripple current

The operating life of the condenser varies significantly depending on ambient temperature and operating conditions. When used continuously in normal environment, its standard life span is 10 years. The condenser becomes aged fast during a specific period. Inspect it at least once a year

(It is desirable to conduct inspection semi-annually in case the life span is nearing the exhaustion point.)

* For judgment criteria, visually Check:

- a. Case status: Check if the sides and bottom of the case are expanded.
- b. Cover plate: Check if significant expansion, severe cracks or damage.
- c. Explosion-proof value: Check for significant expansion or wear
- d. Check periodically the external condition for cracks, tear, discoloration and water leakage, If the rated capacity of the condenser drops to 85[%] or less, it indicates life span has exhausted.

1 Relays

Inadequate contact may occur due to contact wear resulting from switching current. The really wear condition is affected by the power capacity. The standard life span is 100,000 accumulated switching (switching life) operations.

2 Motor Bearing

Replace bearing when it is used for 20,000~30,000 hours under rated speed and rated load. The motor bearing condition is dependent upon the operating conditions. Replace the bearing if abnormal noise or vibration is discovered.

Parts	Standard replacement period	How to replace
Smoothing condenser	7~8 years	Replace with new parts (decide after check)
Relays	_	Decide after check
Fuses	10 years	Replace with new ones
Aluminum electrolytic	F	
Condenser on PCB	5 years	Replace with new PCB(Decide after check)
Cooling fan	4~5 years	Replace with new ones
Motor oil seal	_	Decide after check
Motor oil seal	5,000 hours	Replace with new ones

[Standard replacement period]



7.2 Fault Diagnosis and Corrective Actions

In case an error occurs during operation, alarm display AL-DD or ErrDD is displayed on the display window of loader. At this time, take the following steps. If taking such steps does not correct errors, contact our service center.

7.2.1 Servo motor

Symptom	Cause	Inspection	Corrective action
	CCWLIM, CWLIM input is OFF	Refer to chapter 1.2.System Configuration	Turn "ON" the CCWLIM, CWLIM input
	Menu miss-set	Check menu of motor, encoder and encoder type control mode	Reset menu (refer to chapter 4)
Motor Does not	Motor defective	Check motor lead terminal with a tester(Resistance between each phase ; less than 10[Ω]	If voltage is correct, replace motor
start	Screws loosened	Check the screws	Retighten loose screws
	External miswriting or cable disconnected	Check the motor and encoder wiring	Rewire, Replace cable
	Encoder defective	Check the output wave form	Replace encoder (Use A/S service)
Matar	Defective connection	Check connection of the motor lead terminal	Repair defective part
Rupping	Input voltage low	Check drive input voltage	Change power supply
Unstable	Overloaded	Check machine condition	Remove foreign material from the rotator and lubricate (or grease) it
	Ambient temperature high	Check the motor ambient temperature (should be lover than 40°C)	Change heat-shield structure
Motor	Motor surface stained	Check motor surface for attached Foreign materials	Clean the surface of the motor
Heated	Overloaded	Check the load rate of the drive. Check acceleration/deceleration cycle.	Reduce load Increase Acceleration/deceleration time
	Magnetic power deteriorated	Check counter electromotive voltage	Replace motor
Abberrei	Defective coupling	Check the tightness of the coupling screws and the concentricity of joints.	Readjust coupling
noise	Defective bearing	Check the bearing for vibration or abnormal noise.	Contact our service center
	Parameter miss-set	Check control parameters	Refer to Chapter 4

[Actions to taken in case of errors]



7.2.2 Servo Drive

If the ALARM occurs, error signal out contact (ALARM) is turned OFF, and the motor stops by the action of Dynamic Brake

CODE	Name	Cause	Corrective action
nor-oF	Normal sv-off	Normal operating condition	_
nor-on	Normal sv-on	Normal operating condition	_
AL-01	Not used	_	-
AL-02	Low Voltage	Low Voltage, Main power shut off	Check Input voltage level, Check the wiring of main power supply
AL-03	Line Fail	Motor and Encoder	Check set values and CN2 wiring, U,V,W wiring.
AI -04	Motor Output	Frror of Output (LLV W) open phase	Motor wiring Power Module Error
AL -05	Encoder Pulse	No. of encoder pulse set error	[PE-204] set value CN2wiring Beplace Motor
AL-06	Following Error	Position pulse following error	Check the [PE-502] position command pulse set value, wiring
AL -07	Over Heat	Over hitting	and Limit contact [PE-502], [PE-716] set value, Gain set value.
AL-07	Over Current	Over current	Check the output terminal wiring motor, encoder set value, gain
AL-09	Over Load	Over load	Check Load condition, Brake operating condition, wiring, motor,
AL-10	Over Voltage	Over voltage	Check input voltage, wiring of braking resistance, damage of braking resistance, excessive regenerative operation
AL-11	Over Speed	Over speed	Encoder Error, Check encoder set value, Encoder wiring, gain set, Replace
AL -12	Not Used	Notused	_
ΔΙ –13	Position Pulse error	Position pulse Error	Beplace drive
AL-14	ABS Data Error	Absolute encoder data transmission	Check the initial reset
AL-15	ABS Battery Error	Absolute encoder battery error	Check the initial reset, battery is discharged
AL-16	ABS Multi Error	Absolute encoder multi-rotation	Check the initial reset
AI -17	ABS Bead Fail	Absolute encoder reading error	Absolute encoder check CN2 wiring check
ΔΙ –18	II-Hall Offset Error		Beplace drive
AL -19	V-Hall Offset Error	V phase current sensor Error	Beplace drive
AL -20	Memory Error	Parameter memory Error	Beplace drive
AL _21	Not Used	Not used	
AL 21			Deplace drive
AL-22	Dala Inil Error	Data Initialization Error	
AL-23	EPWR	Hardware error, 9 wires type Encoder Power Error	Replace drive
AL-24	USB Error	USB Communication Error	Check wiring, Replace drive
AL-25	RS422 Error	RS422 Communication Error	Check wiring, Replace drive
AL-26	Over Regeneration	Over regenerative Error of Setting time of [PE-419]	Check input voltage, wiring of braking resistance, Replace drive
AL-27	Current Limit Over	Over current limited (Continuance operation above 1sec)	Motor wiring, Check Load condition
AL-28	Not Used	Not used	
AL-29	Not Used	Not used	
AL-30	In/Out Logic error	In/Out Logic Error	Set value adjustment
AL-31	Encoder N/D Error	Encoder N/D Error	Set value adjustment
AL-32	Egear N/D Error	Egear N/D Error	Set value adjustment
Err1	Error1	Input of parameters, which cannot be changed, is attempted during Servo ON	Turn OFF the servo and change the set value
Err2	Error2	Input of data which is out of set range	Input values within the set range
Err3	Error3	Change the menu which is locked by [PC-810](Menu Data Lock)	Change the menu [PC-810] with unlock condition

[Actions to be taken in case of an alarm]





[Overload charateristic curves of Servo Drive]

Patad	Overload operating time			
current (%)	Min.	Max.	Set vlalue	
100		8		
120		∞		
150	500	1200	800	
200	50	120	80	
250	12	28	20	
300	3	7	5	



[Appendix]

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Appendix 1. Menu summary

The menu is composed of 9 groups and refer to the details on each menu

Menu No.	Menu group	Descriptions
Pd-001 ~ Pd-020	Status Menu	Display the status of operation
PA-101 ~ PA-120	Alarm Menu	Save and display the alarm history
PE-201 ~ PE-220	System Menu	Save the data on system composition
PE-301 ~ PE-320	Control Menu	Save the fixed parameters of control
PE-401 ~ PE-420	Analog Menu	Save the fixed parameters input/output
PE-501 ~ PE-520	InOut Menu	Save the input/output variables
PE-601 ~ PE-620	Speed Operation Menu	Save the fixed speed operation
PE-701 ~ PE-720	Pulse Operation Menu	Save the fixed position pulse operation
PC-801 ~ PC-820	Command Menu	Manipulating operation

Refer to the meanin of abbreviation for the operation mode.

- P: Used in posiiton control mode
- S: Used in speed control mode
- T: Used in torque mode

1). Display menu for the status of operation

	MENU		Unit	Initial		
Comm. code	(CODE)	NAME	Min.	Max.	Description	Mode
0	Pd-001		_	_	Display the status of current operation	PST
	1 4 001	Current State	-	-	-Servo off :nor-oF, Servo on :nor-on, Alarm:AL-XX	
1	Pd-002		[r/min]	0	Display the current operation speed	PST
		Current Speed	-10000	10000		
2	Pd-003		[r/min]	0	Display the current operation speed	ST
		Command Speed	-10000	10000	Display the economidated value of resition	
3	Pd-004	Current Pulse	-999999	99999	-In case of exceeding /Max., it will be displayed as Min/ Max.	Р
			[pulse]	0	Display the accumulated value of following position	PST
4	Pd-005	Feedback Pulse	-999999	99999	command pulse - In case of exceeding Min/Max, it will be displayed as Min/ Max.	
			[pulse]	0	Display the remaining position pulse operated by servo	Р
5	Pd-006	Pulse Error	0	99999	- In case of exceeding Min/Max, it will be displayed as Min/ Max.	
6	Pd-007		_	1000	Display the numerator 0 of electric gear ratio	Р
	1 4 661	E-Gear N0	1	60000		
7	Pd-008	Command Torque	[%] -300.00	0 300.00	Display the current command torque under torque operation - PS: Accumulated current command torque, T :Current command torque	Т
			[%]	300	Display torque limitation	PST
8	Pd-009	Torque Limit	-300	300		101
0			[%]	0.00	Display the current load rate comparing with the	PST
9	Fu-010	Current Load	0.00	300.00	rating	
10	Pd_011		[%]	0.00	Display the average load rate for 5 seconds	PST
10	Fu VII	Average Load	0.00	300.00	comparing with the rating	
11	Pd-012		[%]	0.00	Display the max. instantaneous load rate comparing	PST
	10 012	Maximum Load	-300.00	300.00	with the rating	
12	Pd-013		[V]	0.0	Display the DC Link of current main power	PST
12	10 010	DC Link Voltage	0.0	500.0		
10			—	_	Display the status of connection of CN1 input contact point	PST
13	P0-014	I/O SET	-	-	Light	
			0	0	Display the status of operating time of regenerative	DOT
14	Pd-015	Reg. Brake Time	[ms]	3000	braking Display the value fixed at [PE-419]	FOI
			_	_	Display the status of I/O contact point logic	DOT
15	Pd-016	I/O State	_	_	recognized from CN1 I/O	PS1
		., 5 01010	_	01100	Display the status of logic for input contact point 0~4	DOT
16	Pd-017	Input Logic Set	00000	11111	4=pclear/stop/tclear,3=cwl,2=ccwl,1=almrst,0=svon	1-01
47			-	0000	Display the status of logic for input contact point 5~8	1
1/	Pd-018	Input Logic Save	0000	1111	8=egear2/spd2,7=egear1/spd1,6=mode/trqlim,5=dir	
10	Dd- 010		—	001	Display the logic of output contact point]
10	Pu-019	Output Logic Set	000	111	2=inspd/inpos, 1=Ready/Brk, 0=Alarm	
10	Pd-020		_	_	Display the secret No. of software version	PST
19	F U=020	Software Version	-	-		

* You can check the Display Menu under alarm status when you press [Enter] after pressing [Left] or [Right]

2) Dispalying the status of alarm

(MENU)			Unit	Initial		
Comm .code	comm (CODE) (NAME)		Min.	Max.	Description	
	Alarm history 01 ~ 20			-		
20	PA-101	Alarm History01				DOT
~	~	~	_	-	Display the alarm history	FOI
39	39 PA-120 Alarm History20					

Alarm code and check

CODE	Name	Description or main cause	Check point
nor-oF	Normal svoff	Normal status of Servo off	_
nor-on	Normal svon	Normal status of Servo on	_
AL-01	Not used	_	-
AL-02	Low Voltage	Low voltage, main power is turned off	Input level, wiring of power
AL-03	Line Fail	Wrong wiring of motor /U,V,W, of encoder	Fixed value, CN2 wiring, U,V,W wiring, replacing motor
AL-04	Motor Output	Malfunction of driving circuit of motor	Motor wiring, power module error
AL-05	Encoder Pulse	Wrong setting the no. of encoder pulse	Fixed value of [PE-204], CN2 wiring, replacing motor
			Excessive position command pulse
AL-06	Following Error	Wrong following position pulse	, wiring and limit contact point,
AL 07	Owner I I and		[PE-502], fixed value of [PE-718], gain setting value
AL-07	Over Heat	Over heat	status of load, installing heatproof pan
AL-08	Over Current	Over current	Heplacing wiring, motor, phase resistance, encoder setting value and wiring, replacing
AL 00	Overland		
AL-09	Over Load	Over load	I he status of load, Brake, wiring, motor, encoder setting value
AL-10	Over Voltage	Over voltage	Input voltage, regenerative resistor, damage, wiring, excessive regenerative
	Our of Our of I		operation
AL-11	Over Speed	Over speed	Encoder error, encoder setting value, encoder wiring, gain setting, replacing motor
AL-12	Not Used	Not used	-
AL-13	Position Pulse error	Position pulse error	Replacing drive
AL-14	ABS Data Error	Transmitting error of absolute encoder	Initial reset
AL-15	ABS Battery Error	Battery error of absolute encoder	Initial reset, discharge of battery
AL-16	ABS Multi Error	Error with transmitting Multi-rotation data of absolute encoder	Initial reset
AL-17	ABS Read Fail	Reading error of absolute encoder	Absolute encoder, CN2 wiring
AL-18	U-Hall Offset Error	Current sensor error of U phase	Replacing drive
AL-19	V-Hall Offset Error	Current sensor error of V phase	Replacing drive
AL-20	Memory Error	Memory error of parameter	Replacing drive
AL-21	Not Used	Not used	
AL-22	Data Init Error	Initialization error of Data	Replacing drive
AL-23	EPWR	Hardware error, power error of 9 lines encoder	Replacing drive
AL-24	USB Error	USB comm. Error	Wiring inspection, replacing drive
AL-25	RS422 Error	RS422 comm. Error	Wiring inspection, replacing drive
AL-26	Over Regeneration	Excessive regeneration (Error of Setting time of [PE-419])	Input voltage, regenerative braking wiring, replacing drive
AL-27	Current Limit Over	Excessive current limit	Motor wiring, the status of load
AL-28	Not Used	Not used	
AL-29	Not Used	Not used	
AL-30	In/Out Logic error	Logic error of I/O	Revising the fixed data
AL-31	Encoder N/D Error	Prescaler ratio error of Encoder output	Revising the fixed data
AL-32	Egear N/D Error	Prescaler ratio error of electric gear	Revising the fixed data
Err1	Error1	When you try to change the menu which can't be	Povice monu after Serve-off
		allowed revised under Servo-on	
Err2	Error2	In case that the data which exceeds the limitation is input	Input the data which is within the range
Err3	Error3	When you try to change the menu under [PC- 810](Menu Data Lock)	Change the data under Unlock at [PC-810]

3) System variables setting menu

	(MENU)			Initial			
Comm .code	(CODE)	(NAME)	Min.	Max.	Description	Mode	
40	*PE-201		_	_	Setting motor ID	PST	
		Motor ID	0	99	Motor ID is set automatically from PE-210 to PE218		
			[bps]	0	Setting the speed of RS422 comm. of CN3	PST	
41	*PE-202	Baud Rate	0	3	0:9600, 1:19200, 2:38400, 3:57600		
			_	0	Setting the encoder type	PST	
42	**PE-203	Encoder Type	0	4	0: 15 lines A lead, 1: 15 lines, B lead, 2: 9 lines, A lead, 3: 9 lines B lead, 4: 7 lines INC. 17 / 21bit		
12	44DE-204		[p/r]	2500	Setting the no. of pulse per rpm of encoder	PST	
43	**FE=204	Encoder Pulse	1	6000			
44	PE-205		[%]	300	Setting torque limitation at CW rotation		
	16 200	CCW TRQ Limit	1	350			
45	PE-206		[%]	300	Setting torque limitation at CCW rotation	PST	
		CW TRQ Limit	1	350			
46	*PE-207	Quatara ID	-	0	Setting the drive ID at communication	PST	
		System ID	0	99	Catting the mount ID of the drive at compounded in	DOT	
47	*PE-208	System Group ID	0	99	Setting the group ID of the drive at communication	гот	
			_	2	Setting the start menu of drive	PST	
48	PE-209	Start Menu No	1	20		1 0 1	
			[gfcms ²]	ID	Setting the moment of inertia of motor	PST	
49	*PE-210	Inertia	0.01	300.00			
50		[kgf·cm/A		ID	Setting the torque constant of motor	PST	
50	*PE-211	Trq Con	0.01	300.00			
51	*PE-212		[mH]	ID	Setting the phase inductance of motor.	PST	
51		Phase Ls	0.001	30.000			
52	*PE-213		[ohm]	ID	Setting the phase resistance of motor.		
		Phase Rs	0.001	30.000			
53	*PE-214			ID	Setting the rated current of motor	PST	
		Rated Is	0.01	999.99		DOT	
54	*PE-215	Mary Oraca al	[r/min]		Setting the max. speed of motor	PST	
		Max Speed	0.0	300.00		DOT	
55	*PE-216	Patad Speed		10000	Setting the current speed of motor	P01	
		nateu Speeu			Satting the new of pales of mater	PST	
56	*PE-217	Pole Number	2	98			
			-	0	Setting the gain group of motor	+	
57	*PE-218	Motor Gain Group	0	9			
50			[mA]	0	Setting the current offset of U phase		
58	PE-219	U Current Offset	-200	200			
50	PE-220		[mA]	0	Setting the current offset of V phase		
29	PE-220	V Current Offset	-200	200			

4) Control variables setting menu

	(MENU)			Initial		
Comm .code	(CODE)	(NAME)	Min.	Max.	Description	Mode
60	PE-301		[HH]	2.0	Setting the ratio of inertia of load	PST
00	FE-301	Inertia Ratio	1.0	500.0		
a ([1/s]	50	Setting proportional gain 1 at position control	Ρ
61	PE-302	Position P Gain1	1	500	 [PE-520] : 1, it is applied when pulse error is less than [PE- 306] 	
00			[1/s]	70	Setting proportional gain 2 at position control	Ρ
62	PE-303	Position P Gain2	1	500	- [PE-520] : I, it is applied when pulse error is less than [PE- 306]	
63	PE-304		[%]	0	Setting the control ratio of position feedfoward	Ρ
		P Feedforward	0	100		
64			[ms]	0	Setting the control filter constant of position feedfoward	Р
	PE-305	P FF FLT TC	0	100.00		
65			[10pulse]	0	Setting the conversion range of position gain 1,2	Р
05	FL 300	Position Zero Gain	0	5000	[PE-306]	
<u> </u>			[rad/s]	500	Setting speed proportional gain 1	PS
00	PE-307	Speed P Gain1	0	5000	- [E-520]:1, it is applied when the current speed is less than [PE-313]	
67	DE-209		[rad/s]	800	Setting speed proportional gain 2	PS
07	PE-306 Speed P Gain2		0	5000	- [E-520]:1, it is applied when the current speed is more than [PE-313]	
68	PE-309		[ms]	20	Setting the constant 1 of speed integral	PS
00		Speed TC1	1	10000	- [E-520]:1, it is applied when the current speed is less than [PE-313]	
69	69 PE-310 Speed I TC2		[ms]	13	Setting the constant 2 of speed integral	PS
			1	1000		
70	PE-311			0.50	Setting speed command filter	S
		Speed IN FI	0.0	0.50	Setting speed feed-back filter	DS
71	*PE-312	Speed E/B ET		100.0	Setting speed reed back litter	го
			[r/min]	0	.Setting the speed range of zero sped gain	PS
72	PE-313	7 0 10 1	[1/1111]		- The speed which converts speed control gain $1 \rightarrow 2$	10
		Zero Speed Gain	0	500	- In case of 0. [PE-519] is not available	
73	PE-314		[ms]	0.50	Setting torque command filter	PST
	-	TORQ. CMD FLT	0.0	100.00		0.07
74	PE-315		_	0	Setting the motions Width to avoid resonance	PST
		DE-Resonance	0	1		0.07
75	PE-316		[Hz]	300	Setting the operation frequency to avoid resonance	PSI
		Notch Frequency	0	1000	Catting the Dand Width to quaid recommend	DOT
76	PE-317	Notob Dondwidth	[HZ]	100	Setting the Band width to avoid resonance	P51
		NOLCH BANGWIGH	0	1000	0: Not used	DOT
77	PE-318	Overload offset	0	1	1: Used	FOI
				20	Setting the ranged nulse of position proportional gain 2	S
78	PE-319		[Topulse]	20	- [F-520]:1. it is converted into gain 2 when pulse error is more than	0
		Position Gain2 Range	1	5000	[PE-319]	
			_	1	Setting the function to improve the torque of zero speed	S
79	PE-320				0 : Not used	
		Zero Speed Lock	0	1	1 : operated	

5) Analog I/O variables setting menu

	(MENU)		Unit	Initial		
Comm .code	(CODE)	(NAME)	Min.	Max.	Description	Mode
80	*PE-401		[r/min]	2000	Setting the analog speed command at 10[V]	ST
		Analog Speed	1	6000		
81	PE-402	Apolog Spood Offoot	[mV]	1000	Setting the offset of analog speed command	S
		Analogopeed Onsel	-1000	0	Setting the clamp function of analog zero speed	0
82	PE-403	Zero Speed Clamp	0	1	0 : Not used, 1 : operated	S
00			[mV]	1	Setting the range of analog zero speed clamp	S
83	PE-404	SClamp Volt	1	1000		0
84	*PE-405		-	0	Setting speed override operation function	S
04	^T L 403	Speed Override	0	1	0:Not used, 1:operated	
85	*PE-406		[%]	100	Setting torque command at 10[V]	PST
		Analog Torque	1	300		
86	PE-407	T 0111	[mV]	0	Setting the offset of analog torque command	Т
		Torque Offset	-1000	1000	Catting the elementium of appled zero targue	
87	PE-408		_	0	command	Т
01		TClamp Mode	0	1	0 : Not used, 1 : operated	
88	RE-400		[mV]	1	Setting the clamp voltage of analog zero torque command	Т
00	1 L 403	TClamp Volt	1	1000		
20			_	1	Setting the type of analog 1 for monitor	PST
89	PE-410	Monitor Type1	0	5	 command speed, 1-current speed, 2-command torque, 3-current torque, 4-command pulse frequency. 5:error pulse. 	
			_	0	Setting the mode of analog output 1 of monitor	PST
90 PE	PE-411	Monitor Model	0	1	0:-5~+5V	101
			•	1.0	1:0~+5V(absolute value)	
91	PE-412		_	1.0	Speed :Max, speed, torque:300%, command pulse:500k, error	PST
		Monitor Scale1	0.1	50.0	pulse :excessive position error	
92	PE-413		[mV]	0	Setting offset of analog output 1 for monitor	PST
02		Monitor Offset1	-1000	1000		
03			—	3	Setting the type of analog output 2 for monitor	PST
30	FL 414	Monitor Type2	0	5	pulse frequency, 5-error pulse	
			_	0	Setting the mode of analog output for monitor	PST
94	PE-415	Monitor Mode2	0	-	0∶−5~+5∨	101
		MONITOR MODEZ	0	I	1:0~+5V(absolute value)	
OF			-	1.0	Setting magnification of analog output 2 for monitoring	PST
90	PC-410	Monitor Scale2	0.1	50.0	excessive position error	
			[mV]	0.0	Setting the offset of analog output 2 for monitoring	PST
96	PE-417	Monitor Offset2	-1000	1000		101
			_	0	Selecting direction of motor operation under torque mode	Т
97	PE-418	Torque Com Dir	0	1	0: + voltage, CW	
		· · · · · · · · · · · · · · · · · · ·	[ms]	500	Setting the max, running time of regenerative braking	
08	DE_/10		[110]		resistor	
90	FC-419	Regeneration Brake time	100	1000	In case of exceeding the time, excessive	
					regeneration[AL-26] occurs	
			_	U	Applying [PC-013], [PC-014] analog offset function 0 : Not used	ST
99	PE-420	Proved Torris a Owned Official			1 : PC-813 is available	
		Speed, 1 orque Umd Uttset	U	٢	2: PC-814 is available	
					3: PC-813, PC-814 are available at the same time	

6) I/O contact point variables setting menu

	(MENU)		Unit	Initial		
Comm .code	(CODE)	(NAME)	Min.	Max.	Description	Mode
100	PE-501	Inposition	[10pulse] 1	10 60000	Setting the output range of position operation completion signal	Ρ
101	PE-502	Follow Error	[10pulse]	90000	Setting the output range of position operation following error signal	Ρ
			[r/min]	10	Setting the output range of zero speed signal	DOT
102	PE-503	Zero Speed RNG	0.0	6000		P51
100			[r/min]	100	Setting the output range of speed attachment completion	S
103	PE-504	Inspeed	0.0	500	signal	0
104	PE-505		[r/min]	50	Setting the output speed of brake signal	PST
101	1 2 000	Brake SPD	0.0	6000		
105	PE-506		[ms]	10	Setting the output delaying time of brake signal	PST
		Brake On Delay Time	0	1000	Satting the main power error resat made of error	
106	PE-507	PowerEpil Mode		1	0: Manual reset . 1: Auto reset	PST
			-	0	Select the output point of Ready/Brake	DOT
107	PE-508	Beady / Brake Select	0	1	0 : Ready output , 1 : break output	PST
		rically , Clarb Coloci	-	1	Setting the clear mode of position pulse	D
108	PE-509	PE-509 Pulse Clear Mode		1	0: Edge(off \rightarrow on) , 1: Level(on)	Г
100			-	1	Setting the numerator of prescaler for encoder output	PST
109	09 **PE-510 Pulse Output Nume		1	16384	pulse	1.01
110	110 **PE-511 Pulse output Denominator		-	-	Setting the denominator of prescaler for encoder output	
110			1	16384	pulse	
111	1 **PE-512		_	0	Setting the direction of encoder output pulse A/B phase	PST
		Pulse Output A/B Lead	0	1	0 : A phase Lead, 1 : B phase Lead	
112	PE-513		-	1	Setting the output pulse type of serial encoder' Z phase	PST
		Pulse Output Z	0	1		
			_	0	Setting the switch to change the operating direction	S
113	PE-514	Dir Salaat Mada	0	1	0 : DIR ON→converted into analog direction, STOP→STOP	
		Dir Select Mode	0	I	1 : DIR OFF, STOP ON \rightarrow CCW / DIR ON, STOP OFF \rightarrow CW	
			_	001	Satting the logic of output contact point	
114	*PE-515	Output Logic	000	111	2=inspd/inpos_1=Ready/Brk_0=Alarm	PST
			[ms]	0	Setting the delaying time which is the actual PWM-OFF	DOT
115	PE-516	PWM off Delay	10	1000	under Servo-OFF	P51
110			_	01100	Setting the logic status of input contact 0~4	PST
116	*PE-517	Intput 0~4 Logic	00000	11111	4:pclear/stop/tclear, 3:cwl, 2:ccwl, 1:almrst,0=svon	1.01
117			-	0000	Setting the logic status of input contact 5~8	PST
117	*25-218	Intput 5~8 Logic	0000	1111	8:egear2/spd2, 7:egear1/spd1, 6:trqlim/mode, 5:dir	
			[%]	50	Setting zero speed gain ratio	S
118	PE-519	ZSPD Gain Rate	1	100		-
			-	0	Setting gain 1, gain 2 mode	PST
119	*PE-520	Gain Conv Mode 0	0	1	 0 : gain 1 only 1 : conversion mode of gain 1, 2 a. [PE-601] : 1 the current speed is [PE-313] or more: speed gain 1 → 2 b. [PE-601] : 2 (including a) Error pulse is [PE-306] or below: position gain 1 - : position gain 1→2 Error pulse is [PE-319] or below: position gain 2 	

7) Speed operation variables setting menu

	(MENU)			Initial		
Comm	(CODE)	(NAME)	Min.	Max.	Description	Mode
120	*PE-601	Operation Mode	0	1	Set the operation mode 0: torque control operation 1: speed control operation 2: position control operation 3: speed/position control, In case of mode=off, position control 4: speed/torque control In case of mode=off, torque	PST
			[r/min] 200		control 5: position/torque control, in case of mode=off, torque control Selected by the combination of anexed command	
121	PE-602	Speed Command1		6000	selected by the combination of speed command input contact point SPEED1 / SPEED2	ST
122	PE-603	Speed Command2	[r/min] -6000	1000 6000	SPD1 SPD2 OFF OFF : analog speed command	ST
123	PE-604	Speed Command3	[r/min] -6000	3000 6000	ON OFF : Internal speed command 1 OFF ON : internal speed command 2 ON ON : internal speed command 3	ST
124	PE-605	Not Used				
125	PE-606	Not Used	F (
126	PE-607	Z Search Operation Speed	[r/min]	10 300	Setting the speed for encoder's Z phase search operation - Fixed value for the operation of PC-806	PST
127	PE-608	Manual P Operation Speed	[r/min] 1	500 6000	Setting the speed for manual position operation - Fixed value for the operation of PC-807	
128	PE-609	Accel Time	[ms] 0	0 10000	Setting the accel. time of speed command	S
129	PE-610	Decel Time	[ms] 0	0 10000	Setting the decel. time of speed command	S
130	*PE-611	S Type Control	- 0	0	Setting S shaped operation at speed mode 0 : lineal accel./decl., 1 : S shaped accel./decl	S
131	PE-612	Test Run Speed0	[r/min] -6000	100.0 +6000	Setting the speed 0 under continuous test run	PST
132	PE-613	Test Run Speed1	[r/min] -6000	-500.0 +6000	Setting the speed 1 under continuous test run	PST
133	PE-614	Test Run Speed2	[r/min] -6000	1000.0	Setting the speed 2 under continuous test run	PST
134	PE-615	Test Run Speed3	[r/min] -6000	-2000.0 +6000	Setting the speed 3 under continuous test run	PST
135	PE-616	Test Run Time0	[s] 1	5 3600	Setting the speed 0 under continuous test run	PST
136	PE-617	Test Run Time1	[S] 1	5 3600	Setting the speed 2 under continuous test run	PST
137	PE-618	Test Run Time2	[S] 1	5 3600	Setting the speed 2 under continuous test run	PST
138	PE-619	Test Run Time3	[s] 1	5 3600	Setting the speed 3 under continuous test run	PST
139	PE-620	Inspeed Type	- 0	1	Setting the output type of INSPD out contact point 0 : zero speed output , 1 : coincided speed	S

8) Setting position operation variables

	(MENU)			Initial				
^{Comm.}	(CODE)	(NAME)	Min.	Max.	Description	Mode		
			-	1	Set the logic of position operation input pulse	Р		
140	*PE-701	Pulse Logic	0	5	0: negative logic A/B pulse, 1: negative logic 2-pulse 2: negative logic 1-pulse, 3: positive logic A/B pulse 4: positive logic 2-pulse, 5: positive logic 1-pulse			
141	*PE-702		_	1000	Set the denominator/numerator 0,1,2,3, of electric	Р		
	1 2 1 0 2	Electric Gear N0	1	30000	gear ratio			
142	*PE-703	Electric Gear D0	- 1	1000 30000	EGEAR1, Applied electric gear ratio 0, 1, 2, 3 based			
143	*PE-704	Electric Gear N1	- 1	1000	on 2 contact point EGEAR1 / EGEAR2			
			-	2000	Electric gear ratio 0: OFF / OFF			
144	*PE-/05	Electric Gear D1	1	30000	Electric gear ratio 1: ON / OFF			
1.45			_	1000	Electric gear ratio 2: OFF / ON			
145	*PE-706	Electric Gear N2	1	30000	Electric gear ratio 3: ON / ON			
146	+DE 707		-	3000				
140	*PE-707	Electric Gear D2	1	30000				
147	*PE_708		_	1000				
147	AFL 700	Electric Gear N3	1	99999				
148	*PE-709		—	4000				
140	"IL 700	Electric Gear D3	1	30000				
149	PE-710							
		Not used						
			_	0	Select the electric gear ratio	Р		
150	PE-711				0: Electric gear ration 0~3 can be selected			
		E-Gear Mode	0	1	1: Override the offset data to the numerator 0 of electric gear ratio			
			-	0	Select the offset value of electric gear ratio 0	Р		
151	PE-712				a. Set the offset data of numerator 0			
		E-Gear offset	-30000	30000	b EGEAR1 ON \rightarrow increased EGEAR2 ON \rightarrow decreased			
150			_	0	Set the pulse direction of position	D		
152	*PE-/13	Pulse Dir	0	1		E.		
150			[ms]	0	Set the accel/decel. Time of position command	Р		
155	**PE=714	Pos Pulse Acc/Dec Time	0	100				
154	PF-715		_	_				
134		Not Used	-	-				
155	PE-716		_	-				
		Not Used	-	-				
			[lurn]	10.00	Set the target position based on the unit of under manual position operation [PC-807]	PST		
156	PE-/1/	Manual Pos Oper distance	0.00	300.00	You can set the direction at [PC-807] : [Left]-CCW, [Right]-CW			
			-	0	Set the function of limit contact point CCWLIM, CWLIM	Р		
					0 : CCWLIM, CWLIM : Pulse command Clear			
157	PE-718	Pos Limit Pulse Clear	0	1	1 : CCWLIM, CWLIM : Pulse command counter \rightarrow If it exceeds [PE-502] AL-06(Following Error) will			
			[2^]	16	Display the Multi Turn Data of ABS Encoder	PST		
158	*PE-719	ABS Multi Turn	10	16				
			[2^]	17	Display the Single Turn Data of ABS Encoder	PST		
159	*PE-720	ARS Single Turn	10	17				
			10	17				

9) Operation menu

	(MENU)		Unit	Initial				
^{Comm.}	(CODE)	(NAME)	Min.	Max.	Description			
160	PC-801		_	-	Reset the alarm with "CLEAr" message			
100	10 001	Alarm Reset	-	-	If you press [Enter], alarm will be reset with "CLEAr"			
			—	-	Clear all alarm history			
161	PC-802	Alarm His Clear	-	-	If you press [Enter], the alarm history will be cleared (PA- 101~PA-120) with "CLEAr"			
			[r/min]	-	Manual test operation will perform			
162	PC-803	Manual Test Run	 [Enter] : Display test run speed (PE-602) [Up] : PE-602~PE-604 will be displayed by turns The speed will be displayed as absolute value [Right] : CW rotation [Left] : CCW rotation [Enter] : test run is terminated ->return to menu ** If you press [Enter] under alarm status, 'Err1' will be displayed 					
			[r/min]	-	Continuous test run will be performed			
163	PC-804	Auto Test Run	-Min	-Max	 [Enter] : step 0~3 will be performed Step Speed Time 0 PE-612 PE-616 1 PE-613 PE-617 2 PE-614 PE-618 3 PE-615 PE-619 2. [Enter] : test run is terminated ->return to menu ※ If you press [Enter] under alarm status, 'Err1' will be displayed 			
			—	2.0	Automatic tuning operation is performed			
164	PC-805	Gain Tune Run	1	50	 [Enter] : Display the moment of inertia [Up] : Auto gain tuning operation at 100 rpm [Up] : If you keep pressing [Up], it increases by 200rpm as 100->300->500rpm [Right] : continuous operation time is increased [Left] : continuous operation time is decreased If the tuning value is not changed, the work is completed [Enter] : PE-301,307,309 are saved and return to menu % If you press [Enter] under alarm status, 'Err1' will be displayed 			
			[Turn]	0.00				
165	PC-806	Z POS Search	0	9.99	 2 priase search operation at the speed set at [PE-607] 1. [Enter] : Mode execution/clear 2. [Left] or [Right]: operation after setting the direction of Z phase search operation 3. [Enter] : Z phase Z phase search operation is terminated - >return to menu Displayed data : The no. of rpm ※ If you press [Enter] under alarm status, 'Err1' will be displayed. ※ In case of turning ON CCWLIM, CWLIM, operation is not available 			
166	PC-807		[Turn]	-	Operated at the speed set at PE-608 for the target			

					position set at PE-717
					1. [Enter] : Mode execution / clear
					2. [Left] or [Right]: Setting the direction of the target
					position
		Manual Position Run	_	_	 [Up]: Start / Stop [Enter]: Position operation is terminated =>Return to
			_	_	menu
					* Displayed data : The no. of rotation
					※ If you press [Enter] under alarm, 'Err1' will be displayed
					* CCW, CW limit contact point is turn OFF, it will not be applied at
					start time. During operation CCW. CW is not applied
			_	_	Set the forced ON/OFF for output contact points temporarily
					[Right] : out0→out1→out2 Move to the direction of increase
					[Left] ∶out2→out1→out0 Move to the direction of decrease [Up] ∶outx-L ↔ outx-H has been changed
	PC-808				[Enter] : Return to menu
167	10 000	Output Test	_	-	
					 The related bit is L(OFF), H(ON) based on Normal A
					contact point
					out2: INPOS, out1: READY/BRAKE, out0: ALARM
			_	-	Initialize the menu as the status shipped from the factory
					1. [Enter] : If you press [Enter], CLEAr will be displayed
					2. When you press [Left]or [Right], it will return to menu
					without initialization
168	*PC-809	Menu data Init	_	_	3. When you press [Up], the initialization will be performed
100					and return to the menu automatically
					* $[PE-201] \sim [PE-220]$ will not be changed
					* Turn OFF/ON the power
				_	Menu locking function is activated
169	PC-810				1 [Enter] : Lock/upl ock will be changed by turns
		Menu data Lock	_	_	 Kork display: Lock, Unlock display : unlock
			_	_	1. [Enter] : "reset" will be displayed for 5 seconds and rest the
170	PC-811	ABS Encoder set	_	-	absolute encoder
			[A]		
			[mA]	_	Compensate the current offset of Hall-Cl
					2. [Lett] : Display the offset of V phase
					3. [Up] : The offset of U, V phase are saved at PE-
171	PC-812	Current Offset Save	—	_	219, 220 and return to the menu
					If you press [Enter] when you return to the menu after checking the offset, it
					wiii reluiri lo lhe menu wilhoul saving the offset
172	PC-813		[mV]	_	Save the offset data of analog speed command voltage

r		1	Ι		
		Alalog Speed Cmd Offset	-1000 [mV]	1000	 automatically at [PE-402] 1. [Enter] : Display the current analog speed command voltage 2. [Up] : Return to the menu after the displayed value is saved as offset data of analog speed command voltage at [PE-402] ※ If you input 1 or 3 at [PE-420], it can be applied ※ If you press [Enter] when you return to the menu after checking the offset, it will return to the menu without saving the offset Save the offset data of analog torque command voltage automatically at [PE-407]
173	PC-814	AlalogTorque Cmd Offset	-1000	1000	 [Enter] : Display the current analog torque command voltage [Up] :Return to the menu after the displayed value is saved as offset data of analog speed command voltage at [PE-407] ※ If you input 2 or 3 at [PE-420], it can be applied ※ If you press [Enter] when you return to the menu after checking the offset, it will return to the menu without saving the offset
			[%]	-	Display the max. instantaneous load rate
174	PC-815	Maximum Load	-300	300	 [Enter] : Display 00000 initially [Right] : The max. instantaneous load rate of CW rotation [Left] : The max. instantaneous load rate of CCW rotation [Up] : Clear the displayed load rate The value that you can see now is the one before clear You can check again the max. instantaneous load rate after clear by pressing [Left] or [Right] key [Enter]: Return to menu
			[pulse]	-	. Display the following position pulse
175	PC-816	Feedback Pulse	9.9.9.9.9.9	999999	 [Enter]: Display 00000 initially [Up]: Clear the displayed following position pulse [Enter]: Return to menu * '.' means reverse direction
176					
177					
178			_	_	
			_	_	Initialize all menu data as the status of O/S download
179	*PC-820	All Menu Data Init	_	_	 [Up] : Initialization is performed with ALL-CL message and return to the menu automatically (Note) Don't set the menu fixed by manufacturer

Appendix 2. Motor type and ID

ID	Model	Watt	Remarks	ID	Modle	Watt	Remarks	ID	Model	watt	Remarks
1	SAR3A	30		34	SC05A	450	For S/T	67	SE16D	1600	
2	SAR5A	50		35	SC05H	500	For S/S	68	SE22D	2200	
3	SA01A	100		36	SC08A	750	For S/S	69	SE03M	300	
4	SA015A	150		37	HB01A	100	Hollow shaft	70	SE06M	600	
5				38	HC10A	1000	Hollow shaft	71	SE09M	900	
6				39	HE30A	3000	Hollow shaft	72	SE12M	1200	
7	SBN01A	100		40	НВ03Н	250	Semi-conductor	73	SE05G	450	
8	SBN02A	150		41	НС03Н	250	Semi-conductor	74	SE09G	850	
9	SBN04A	400		42	HC03HC6	300	Semi-conductor	75	SE13G	1300	
10	SBN04A-BK	400	Customized	43				76	SE17G	1700	
11	SB01A	100		44				77	HE09A	900	Hollow shaft
12	SB02A	200		45				78	HE15A	1500	Hollow shaft
13	SB04A	400		46				79	SE11M	1050	Special type
14	SB03A	250	Special type	47				80	SE07D	650	Special type
15	HB02A	200	Hollow shaft	48				81	SF30A	3000	
16	HB04A	400	Hollow shaft	49				82			
17				50	SE15D	1500	Special type	83			
18				51	SC20B	2000	Special type	84			
19				52				85	SF22D	2200	
20				53				86	SF35D	3500	
21	SC04A	400		54				87			
22	SC06A	600		55				88			
23	SC08A	800		56				89	SF12M	1200	
24	SC10A	1000		57				90	SF20M	2000	
25	SC03D	300		58				91	SF30M	3000	
26	SC05D	450		59				92	SF44M	4400	
27	SC06D	550		60				93	SF20G	1800	
28	SC07D	650		61	SE09A	900		94	SF30G	2900	
29				62	SE15A	1500		95			
30				63	SE22A	2200		96			
31				64	SE30A	3000		97	SG35D	3500	
32				65	SE06D	600		98			
33	HC06H	600	For S/T	66	SE11D	1100		99	HC05H	500	Customized

ID	Model	Watt	Remarks	ID	Modle	Watt	Remarks	ID	Model	watt	Remarks
100				133				166			
101	SE35D	3500	For DS only	134				167			
102	SE30D	3000	Special type	135				168			
103			For LG	136				169			
			only								
104			Special type	137				170			
105	SE35A	3500	Special type	138				171			
106			Special type	139				172			
107			Special type	140				173			
108	SF35A	3500	Special type	141				174			
109	SE08D	750	Special type	142				175			
110				143				176			
111	SG22D	2200		144				177			
112	SG35D	3500		145				178			
113				146				179			
114				147				180			
115				148				181			
116				149				182			
117				150				183			
118				151				184			
119				152				185			
120				153				186			
121	SG12M	1200		154				187			
122	SG20M	2000		155				188			
123	SG30M	3000		156				189			
124				157				190			
125				158				191			
126				159				192			
127				160				193			
128				161				194			
129				162				195			
130				163				196			
131	SG20G	1800		164				197			
132	SG30G	2900		165				198			
Appendix 3. Trial test procedures

Thank you for purchasing our products.

Please proceed with the trial test as below.



8-16 MECAPION



Guarantee Letter

Installed Date		Guaranteed period	
Model A		Serial No.	
Model B		Serial No.	
Model C		Serial No.	
Model D		Serial No.	
Customer	Name		
	Address		
	Tel.		
Distributor	Name		
	Address		
	Tel.		

These items are produced by MECAPION under our strict Q.C system and test procedure. The guaranteed period is 12 months from installation or 18 months from production. However, The guaranteed period can be changed by the condition of Purchasing agreement.

♦ A/S With Free

When some defect is happened, please contact our agent or A/S center.

We repair the defective item which is in the guaranteed period and using in normal operation condition

A/S With Credit

Below case is not included in A/S With Free.

- Defect from customer's intentional or careless mistake
- Defect from Power supply or connecting device
- Defect from natural disaster(fire, flood, earthquake, Gas accident)
- The item which is not repaired or reconstructed at our agent or A/S center
- The item which do not have MECAPION name plate
- Defect after guaranteed period
- * After installation of our Servo, Please return this guarantee letter to our Q.A Dept.

Receiver: MECAPION Q.A Dept.

Tel: 82-53-593-0066(131), Fax: 82-53-591-8614

