Estimate No.

Order No.

YASKAWA

Customer

User

AC Servo Drive

Sigma-7 FT series AC SERVOPACK

EtherCAT(CoE) Communications References Supplementary manual

Target Product:

Σ-7S SERVOPACK SGD7S-□□□DA0A***F64

□□□:Maximum Applicable Motor Capacity、***:Hardware Options Specification

Remark	Distribution place and number				Section in Charge		
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§ Revision History

Revision History

Revision	Drawing	Approval	Date	Revised Contents
<0>	Y.Nakamura H.Murakami	T.Okubo	15.05.29	First edition.

Index

1. General Information

This specification is about SGD7S-□□□DA0A***F64 servopacks. About the function, the rated specification, the overall size, the wiring and the peripheral device by which this specification has not mentioned, is as same as a standard product.
Please refer to the following material about the matters by which this specification has not mentioned.

・AC Servo dirve Σ-7 series　Overall catalog
　Document No：KAJP S800001 23
・Σ-7 series AC servo drive Σ-7S servopack 400V input specification,EtherCAT(CoE) communications reference product manual
　Document No：SIJP_S800001 80A

There are following functions in this product. Please read this chapter about the details of all functions.

No	function	Contents
1	ZONE Output	ZONE output is function that indicates the position with Signals.
2	Jerk motion mode	Positioning is executed with jerk acceleration/deceleration.
3	OverTravel State Release Method Selection	OverTravel State Release Method Selection supply two methods to release OverTravel State.

1.1. SigmaWin+ Connnection

When connecting SGD7S-□□□DA0A***FT64 with SigmaWin+, please use FT64 Component. And the version of SigmaWin+ is below『Ver.5.72』.

If FT64 Component cannot be used, the parameter in chapter7 cannot be done.

2. Trial Operation・Operation

2.1. Automatic electronic gear adjustment function of connection motor

When connect to a Servomotor, servopack will adjust the electronic gear with automatic and consider as a resolution of 1048576 [inc] per revolution. Please set the Position User Unit (2701h) if the adjustment is required.

3. ZONE output signals

3.1. layout of output signals

Please refer to output signals, 6.1.2 chapter of the EtherCAT(CoE) Product manual.（Document No：SIJP_S800001 80A）

output signals name & related parameters	output signals	CN1pin No.					Invalid （Not used）
		1, 2	23,24	25,26	27,28	29,30	
ZONE output signals 0 PnBA0(2752h)=n.□□□X	/ZONE0	1	2	3	4	5	0
ZONE output signals 1 PnBA0(2752h)=n.□□X□	/ZONE1	1	2	3	4	5	0
ZONE output signals 2 PnBA0(2752h)=n.□X□□	/ZONE2	1	2	3	4	5	0
ZONE output signals 3 PnBA0(2752h)=n. X□□□	/ZONE3	1	2	3	4	5	0
nZONE output PnBA1(2753h)=n.□□□X	/nZONE	1	2	3	4	5	0

3.2. general information

ZONE output is function that indicates the position about ZONE table by ZONE signals.
ZONE signals(/ZONE0 ～ /ZONE3) can alloc to CN1 output signals(/SO1 ～ /SO5).

3.3. ZONE table and ZONE signals

ZONE table, which consists of ZONE N, ZONE P, is allowed to enter in every region.
There are 16 regions that can be entered.
ZONE N is ZONE's downside limit value; ZONE P is ZONE's upside limit value.

ZONE table			ZONE signals			
ZONE number [ID]	ZONE N [Pos.unit]	ZONE P [Pos.unit]	/ZONE3	/ZONE2	/ZONE1	/ZONE0
0	2751h:01	2750h:01	0	0	0	0
1	2751h:02	2750h:02	0	0	0	1
2	2751h:03	2750h:03	0	0	1	0
3	2751h:04	2750h:04	0	0	1	1
4	2751h:05	2750h:05	0	1	0	0
5	2751h:06	2750h:06	0	1	0	1
6	2751h:07	2750h:07	0	1	1	0
7	2751h:08	2750h:08	0	1	1	1
8	2751h:09	2750h:09	1	0	0	0
9	2751h:10	2750h:10	1	0	0	1
10	2751h:11	2750h:11	1	0	1	0
11	2751h:12	2750h:12	1	0	1	1
12	2751h:13	2750h:13	1	1	0	0
13	2751h:14	2750h:14	1	1	0	1
14	2751h:15	2750h:15	1	1	1	0
15	2751h:16	2750h:16	1	1	1	1

<Note>
“1” symbols signals are active, “0” symbols signals are inactive.

3.4. ZONE table output condition

The relationship between ZONE table settings and ZONE number is cited as follows.

• ZONE N ≦ ZONE P

ZONE N ≦ Feedback position ≦ ZONE P(the grey part), the corresponding ZONE number is output.

· ZONE P ＜ ZONE N

Feedback position ≦ ZONE or ZONE N ≦ Feedback position(the grey part), the corresponding ZONE number is output.

• When ZONE table settings are duplicated, the smaller ZONE number is active.
• ZONE N = ZONE P = 0, the ZONE number becomes inactive.
• When current value is outside the range, all of the ZONE signals are off (0).

3.5. ZONE table settings and ZONE number

Setting condition between ZONE N and ZONE P is cited as follows.

setting range	setting unit	factory setting	when enabled
-2147483648 ～ 2147483647	Pos.unit	0	0

ZONE table is set by Zone Table Positive border (2750h) and Zone Table Negative border (2751h).

indexer	subindex	name	Access	PDO mapping	unit	Date type
2750h	Zone Table Positive border (ZONE P)					
	1	ZONE ID 0	RW	not used	Pos.unit	DINT
	2	ZONE ID 1	RW	not used	Pos.unit	DINT
	3	ZONE ID 2	RW	not used	Pos.unit	DINT
	4	ZONE ID 3	RW	not used	Pos.unit	DINT
	5	ZONE ID 4	RW	not used	Pos.unit	DINT
	6	ZONE ID 5	RW	not used	Pos.unit	DINT
	7	ZONE ID 6	RW	not used	Pos.unit	DINT
	8	ZONE ID 7	RW	not used	Pos.unit	DINT
	9	ZONE ID 8	RW	not used	Pos.unit	DINT
	10	ZONE ID 9	RW	not used	Pos.unit	DINT
	11	ZONE ID 10	RW	not used	Pos.unit	DINT
	12	ZONE ID 11	RW	not used	Pos.unit	DINT
	13	ZONE ID 12	RW	not used	Pos.unit	DINT
	14	ZONE ID 13	RW	not used	Pos.unit	DINT
	15	ZONE ID 14	RW	not used	Pos.unit	DINT
	16	ZONE ID 15	RW	not used	Pos.unit	DINT

indexer	subindex	name	accesory	PDO mapping	unit	type
2751h	Zone Table Negative border (ZONE N)					
	1	ZONE ID 0	RW	not used	Pos.unit	DINT
	2	ZONE ID 1	RW	not used	Pos.unit	DINT
	3	ZONE ID 2	RW	not used	Pos.unit	DINT
	4	ZONE ID 3	RW	not used	Pos.unit	DINT
	5	ZONE ID 4	RW	not used	Pos.unit	DINT
	6	ZONE ID 5	RW	not used	Pos.unit	DINT
	7	ZONE ID 6	RW	not used	Pos.unit	DINT
	8	ZONE ID 7	RW	not used	Pos.unit	DINT
	9	ZONE ID 8	RW	not used	Pos.unit	DINT
	10	ZONE ID 9	RW	not used	Pos.unit	DINT
	11	ZONE ID 10	RW	not used	Pos.unit	DINT
	12	ZONE ID 11	RW	not used	Pos.unit	DINT
	13	ZONE ID 12	RW	not used	Pos.unit	DINT
	14	ZONE ID 13	RW	not used	Pos.unit	DINT
	15	ZONE ID 14	RW	not used	Pos.unit	DINT
	16	ZONE ID 15	RW	not used	Pos.unit	DINT

3.6. nZONE signals

/nZONE signals are used to indicate feedback position is in ZONE number range (0 ～ 15), which was registered in ZONE table.

type	Signal name	connector pin number	Signal status	meaning
Output	/nZONE	Need setting PnBA0(2752h), PnBA1(2753h)	on	current value is in the registered ZONE table
			off	The value of ZONE N and ZONE P is 0

.

3.7. Examples of ZONE output signals

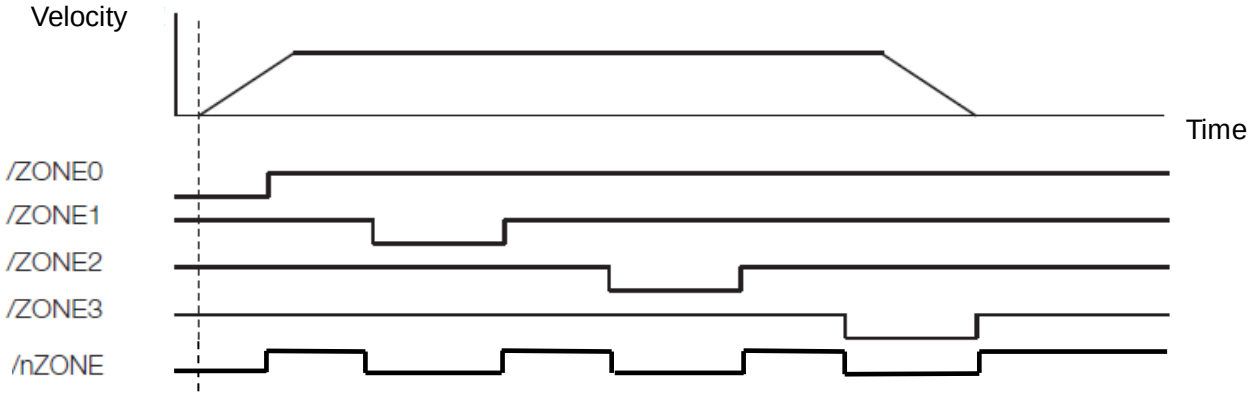
Examples of ZONE output signals used as Field signals

This is the example that if you enter the registered field at each program step, ZONE number is output.
ZONE number might be used as continuous trigger which is connected with Field signals.

■ ZONE table

ZONE number	ZONE N	ZONE P
0	0	0
1	-1000	+1000
2	+99000	+101000
3	0	0
4	+199000	+201000
5	0	0
6	0	0
7	0	0
8	+299000	+301000
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0

If the motor moved by ZONE table setting, signals are output as follows.



⚠ CAUTION

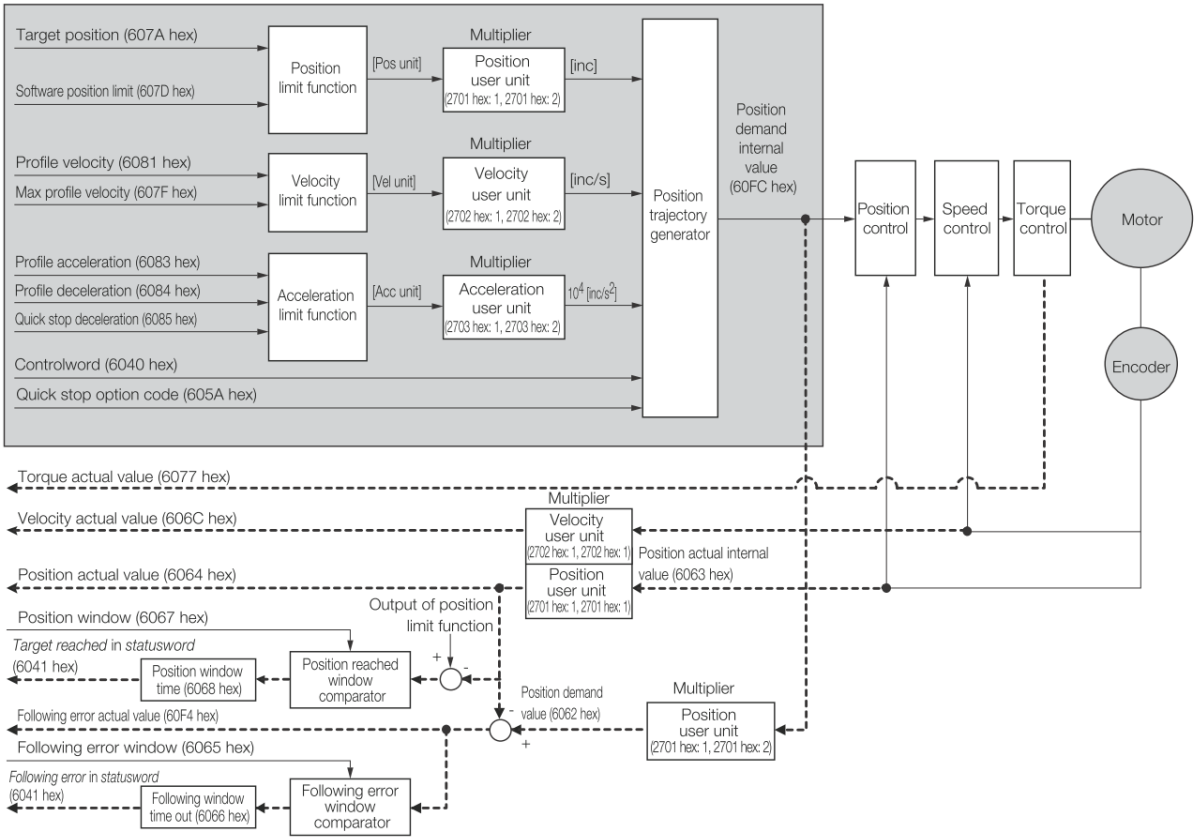
"ZONE output" and "60FEh: Digital Outputs function" are independent.
Please pay attention when you use it.

4. Jerk motion mode

4.1. Scope

If Motion profile type is set "2" for a Profile Mode operation, Positioning is executed with jerk acceleration/ deceleration. Jerk acceleration/deceleration ratio is set Profile jerk.

The following figure shows the block diagram for the Profile Position Mode.



4.2. Related Objects

Index	Sub index	Name	Data Type	Access	PDO Mapping	Value
6040h	0	Controlword	RW	Yes	-	UINT
6041h	0	Statusword	RO	Yes	-	UINT
607Ah	0	Target Position	RW	Yes	Pos unit	DINT
607Dh	Software Position Limit					
	1	Min. position limit	RW	No	Pos unit	DINT
	2	Max. position limit	RW	No	Pos unit	DINT
607Fh	0	Max. Profile Velocity	RW	Yes	Vel unit	UDINT
6081h	0	Profile Velocity	RW	Yes	Vel unit	UDINT
6083h	0	Profile Acceleration	RW	Yes	Acc unit	UDINT
6084h	0	Profile Deceleration	RW	Yes	Acc unit	UDINT
6085h	0	Quick Stop Deceleration	RW	Yes	Acc unit	UDINT
6086h	0	Motion profile type	RW	Yes	-	INT
60A4h	Profile jerk					
	1	Profile jerk 1	RW	Yes	%	UDINT

4.2.1. Motion profile type (6086h)

Select the motion profile.

Index	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
6086h (PnB98)	Motion profile type	INT	RW	Yes	-32768～32767 (default：0)	Yse

■Data Description

Value	Description
0	Linear Acceleration/Deceleration
1	Reserved
2	Jerk Acceleration/Deceleration

If setting the other above, it becomes linear acceleration and deceleration.

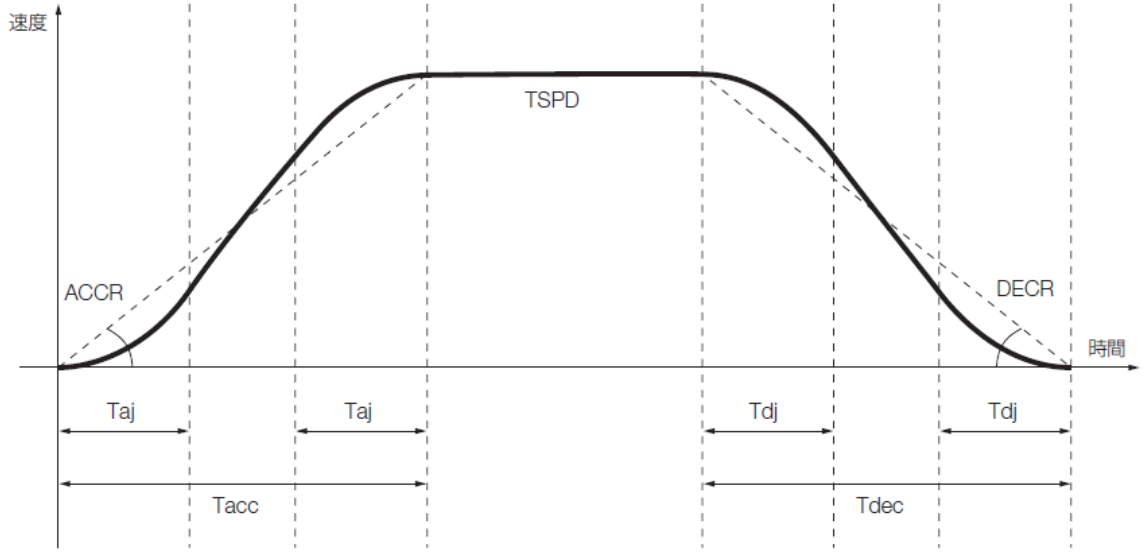
4.2.2. Profile jerk (60A4h)

Set the Jerk acceleration/deceleration ratio

Index	Sub index	Name	Data Type	Access	PDO Mapping	Value	Saving to EEPROM
60A4h (PnB9A)	0	Number of entries	USINT	RO	No	1	No
	1	Profile jerk 1	UDINT	RW	Yes	0～50 (default：0)	Yes

4.3. Operation for Jerk Acceleration/Deceleration

The following figure shows operation for Jerk acceleration/deceleration.



・Acceleration time ：Tacc = Profile velocity (6081h) / Profile acceleration (6083h)
・Deceleration time ：Tdec = Profile velocity (6081h) / Profile deceleration (6084h)
・Jerk acceleration time ：Taj = Profile jerk (60A4h) × Profile acceleration (6083h)
・Jerk deceleration time ：Tdj = Profile jerk (60A4h) × Profile deceleration (6084h)

⚠ CAUTION

1. If Target position (607Ah), Profile velocity (6081h), Profile acceleration (6083h), or Profiledeceleration (6084h) is changed during positioning, the change will be made when positioning is stopped or during constant-speed movement.

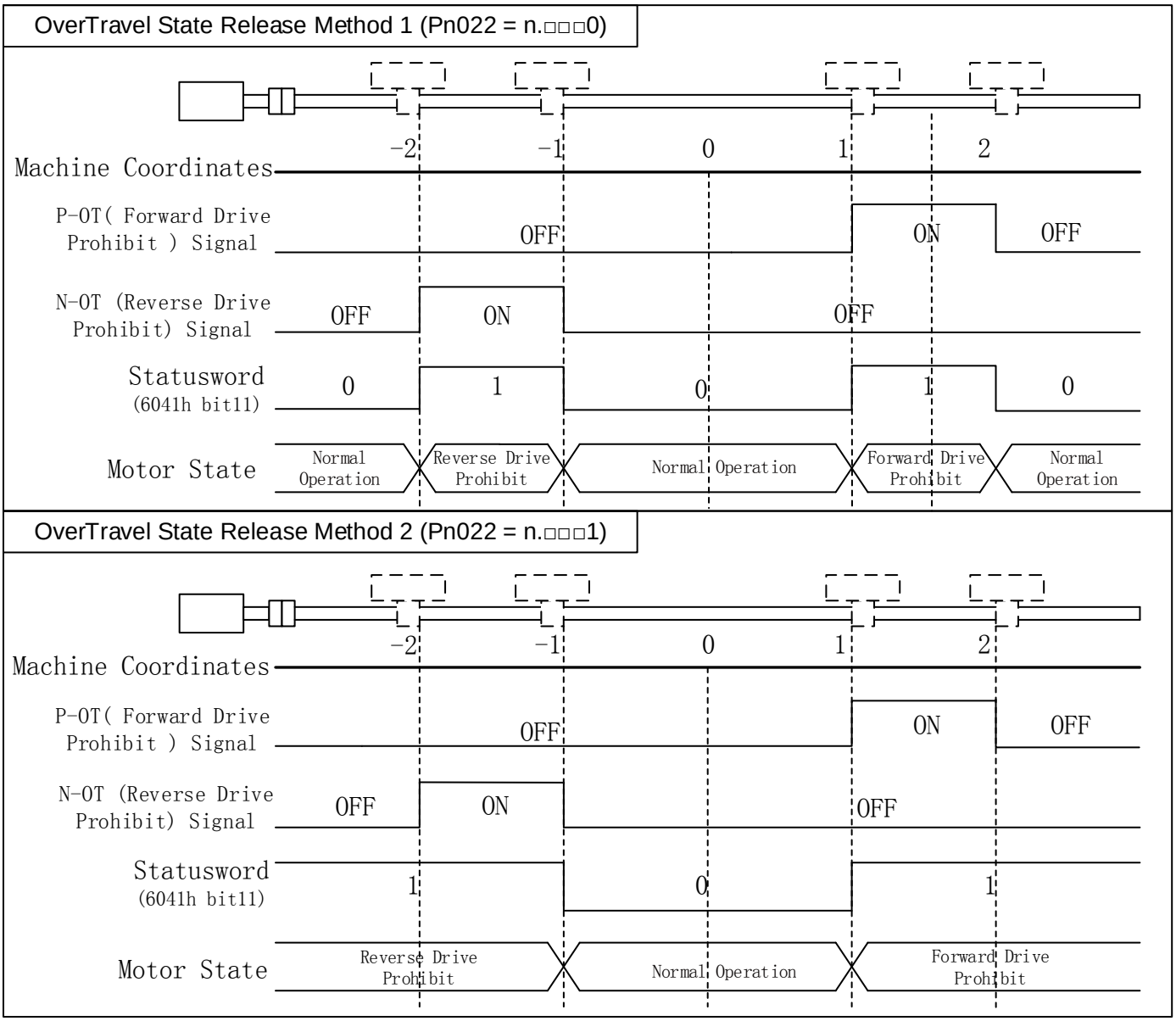
2. If the acceleration/deceleration time is too long, linear acceleration/deceleration will be used.
Linear acceleration/deceleration will be used when the rate of Profile acceleration (6083h), Profile deceleration (6084h) meets the following condition for Profile velocity (6081h).
Profile acceleration (6083h)/Profile deceleration (6084h) [ref/s2] < 700 × √Profile velocity (6081h).

5. OverTravel State Release Method Selection

OverTravel State Release Method Selection supply two methods to release OverTravel State. To select different method, set Pn022 = n.□□□X（OverTravel State Release Method Selection）between 0 and 1

When OverTravel State is ON, the bit 11 of Statusword (Internal limit active) is 1 , In the overtravel state, moving the motor is only allowed in the reverse direction of the present overtravel area (e.g., for P-OT state, a command to move in the negative direction).

Parameter		Meaning	When Enabled	Classification
Pn022 (2022h)	n.□□□0 (default setting)	The Overtarvel state is OFF when P-OT (Forward Drive Prohibit) singal or N-OT (Reverse Drive Prohibit) singal input state is OFF	After restart	Setup
	n.□□□1	Overtravel state will remain ON until the motor will return back from limit area.		



6. Added contents of alarm causes & solution

It described the changes of the alarm in the following

Alarm code： Alarm name	Cause	Check measure	Solution	Remarks
042h： Parameter mismatch error	According to the changes of Program JOG moving velocity（Pn533 (2533h) and Pn585 (2585h)),Speed of program JOG operation has become less than the set range	Check whether the detection condition is established.	Increase the value of Pn533 (2533h) or Pn585 (2585h).	Exsisting
	About DB（Dynamic brake）stop's setting（Pn001.0), DB resistance's setting is error.	Check Pn001.0's setting and Pn601、Pn604	Set Pn001.0, Pn601 and Pn604 correctly.	Addtion

7. Added list of Parameter·Object

Added parameter, object is as followings.

7.1. Parameter

Pn	size	name	Setting range	Setting unit	Factory Setting	Enable Motor	When Enabled	Classification	Referance
Pn022 (2022h)	2	Function selection application switch 22	0000～0011	-	0000	common	After restart	Setup	-

Parameter	Meaning	
n.□□□X	Release method of overtravel state	
	0	Release of overtravel state method 1
	1	Release of overtravel state method 2
n.□□X□	Reserved Parameter（Please don't change）	
n.□X□□	Reserved Parameter（Please don't change）	
n. X□□□	Reserved Parameter（Please don't change）	

7.2. Object

Index	Sub-index	Name	DataType	access	PDO Mapping	Saving to EEPROM	Initial value	Lower limit	Upper limit	Unit	Pn
2750h	ZONE table Positive side boundary position （ ZONE P ）										
	0	Number of entries	USINT	RO	Not used	Not used	16	—	—	—	—
	1	ZONE ID 0	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	2	ZONE ID 1	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	3	ZONE ID 2	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	4	ZONE ID 3	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	5	ZONE ID 4	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	6	ZONE ID 5	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	7	ZONE ID 6	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	8	ZONE ID 7	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	9	ZONE ID 8	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	10	ZONE ID 9	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	11	ZONE ID 10	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	12	ZONE ID 11	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	13	ZONE ID 12	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	14	ZONE ID 13	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	15	ZONE ID 14	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	16	ZONE ID 15	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-

Index	Sub-index	Name	DataType	access	PDO Mapping	Saving to EEPROM	Initial value	Lower limit	Upper limit	Unit	Pn
2751h	ZONE table Negative side boundary position （ ZONE N ）										
	0	Number of entries	USINT	RO	Not used	Not used	16	—	—	—	—
	1	ZONE ID 0	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	2	ZONE ID 1	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	3	ZONE ID 2	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	4	ZONE ID 3	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	5	ZONE ID 4	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	6	ZONE ID 5	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	7	ZONE ID 6	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	8	ZONE ID 7	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	9	ZONE ID 8	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	10	ZONE ID 9	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	11	ZONE ID 10	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	12	ZONE ID 11	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	13	ZONE ID 12	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	14	ZONE ID 13	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	15	ZONE ID 14	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
	16	ZONE ID 15	DINT	RW	Not used	Used	0	-2147483648	2147483647	Pos.unit	-
2752h	0	ZONE output signal Selection 1	USINT	RW	Not used	Not used	0	0x0000	0xFFFF	-	PnBA1
2753h	0	ZONE output signal Selection 2	USINT	RW	Not used	Not used	0	0x0000	0x000F	-	PnBA2