DS-CL28\_42-SA Position Table Technical Manual



# VER 1.0 Technical Manual

# DS-CL28-SA / DS-CL42-SA





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### 1. Before Getting Started

Presented [ DS-CL28/42-SA Technical Manual " Position Table" ] explains position table functions of DS-CL28/42-SA. Here are [ Technical Manual\_ Text ], [ Technical Manual \_Communication Function ] in this manual. Please utilize our product afterward understanding about proper usage method with reading these contents carefully.

The word as 'Position Table' can be presented as PT (Position Table) from the following text. In particular, Please don't forget to memorize whole matters that requires attention about safety in **[Technical Manual\_Text]** and should try to understand properly. Besides please be safe to do not use the products improperly in any case. At worst, serious damage can be occurred as like death. We provide this instruction manual and other instruction manual as well. Please keep these manuals in appropriate place whenever you need to find and read comfortably.

This manual is used for DS-CL28/42-SA



## 2. Windows of Position Table

### 2.1 Loading Position Table Data

When click the 'Pos Table' button on main menu of User Program(GUI), then the system displays the following message box and loads data saved in RAM area of drive.

Progress Dialog	
_	
	Cancel

Functions of Position Table allows to process motions in the orders that were predefined by user. In the case of this DS-CL28/42-SA, up to 256 steps can be saved.

Major functions for saving items are shown as following:

- (1) Editing function of Motion step (Input/Edit/Delete/Copy)
- (2) Start and Stop function of Motion order at User Program(GUI)
- (3) Start and Stop Motion function by signal input from outside drive
- (4) Teaching function
- (5) Functions to save Motion steps as file and to load them from file
- (6) View function of current Position Table order under execution status

When electric power is supplied to drive, the Position Table data saved in ROM area of drive is copied to RAM area and once click the 'Post Table' button, then the system loads the data saved in RAM area of drive.



### 2.2 Main Window of Position Table

The following window describes windows and buttons which execute the position table function.

No	ormal	🖱 Singl	e Step	RUN		ST	OP		Port	12 Slave	No 7		+	•
ositi	on Tabl	е												
No,	CMD	Position	Low Spd	High Spd	Accel	Decel	Wait Time	Continuous	Check Inpos	JP Table No.	JPT 0	JPT 1	JPT 2	Loop
0	7	100000	1	200000	100	100	0		True	1				
1	7	-200000	1	300000	100	100	0		True	2				
2	3	0	1	500000	100	100	0		True	3				
3	3	253000	1	500000	100	100	0		True	6				
4	3	0	1	500000	100	100	0			5				
5	3	-64000	1	500000	100	100	0		True	7				
6	3	10000	1	500000	100	100	0		True	4				
7	3	0	1	250000	100	100	0		True	0				
8														
9														
10														
11														
12														
13														
₹.														÷.

Button	Description
Normal/Single Step	The user can select modes to execute the position table. Normal : All position commands are in order executed according to conditions saved in the position table. Single Step : Only single position command is executed.
Run/Stop/Next	To run/stop items at the defined position table
Teaching	Teaching is executed by either using external input signal or user program. By clicking this button, the user can easily use teaching function at the user program window. For more information, refer to 'Teaching Function'.
Refresh	To display the position value measured by the teaching function. For more information, refer to 'Teaching Function'.
Save to ROM	To save current position table data in ROM drive.
Load from ROM	To open position table data saved in ROM drive
Save to file	To save current position table data to an external file (It is saved to a folder defined by the user with a file name defined by the user. The extension are "txt" and "xlsx".)



Button		Description
	To read position table data saved	in external file
Load File	두 업기     ● ● ● ↑ 컴퓨터 ▶ 1stPartHDD (D.) ▶ Job ▶     구성 ● ● ● ↑ 컴퓨터 ▶     ● Dropbox     ● □ □ □ □ □ □ □ □ □ □ □     ● □ □ □ □ □ □ □ □     ● □ □ □ □ □ □ □ □     ● □ □ □ □ □ □ □     ● □ □ □ □ □ □     ● □ □ □ □ □ □     ● □ □ □ □ □ □     ● □ □ □ □ □     ● □ □ □ □     ● □ □ □ □     ● □ □ □     ● □ □ □     ● □ □ □     ● □ □ □     ● □ □ □     ● □ □ □     ● □ □ □     ● □ □ □     ● □ □ □     ● □ □     ● □ □     ● □ □     ● □ □     ● □ □     ● □ □     ● □ □     ● □ □     ● □ □     ● □ □     ● □ □     ● □ □     ● □     ● □     ● □     ● □     ● □     ● □     ● □     ● □     ● □     ● □     ● □     ● □     ● □	Prj > PULSERVO >    4 2   PULSERVO 검색   2     대<   ·   4 3   PULSERVO 검색   2     수정한 날짜   유형   크기   2017-11-15 오후   파일 몰려     2017-01-26 오후   파일 몰려   2018-03-16 오후   파일 몰려     2018-03-16 오후   파일 몰려   9   9      Position Table File(*txt; *xlsx)    *   1     열기(0)   취소

- \* Up to 256 position table commands can be input and saved for DS-CL28/42-SA.
- \* By using each position table command, the user can edit the file such as edit, copy, paste, and delete.



### 2.3 Position Table Editor

When click right mouse button on a selected Position Table data line, then the following popup menu is activated.

Position Table								
No,	СМБ		Position	Low Spd		High Spd		Ac
0	7		100000	1		200000	)	100
2	3	1	253000	1		500000	, ) )	100
4	3		20000	1		500000	,	100
5 6 7 8 9 10 11	3 3		Edit Ite Clear I Clear A Cut Ite Copy I	Edit Item Clear Item Clear All Items Cut Item Ct Copy Item Ct				100 100 100
12			Run It	em		•		
Teachin S			Show	Colur	nns		Lo	ad R

- (1) Edit Item: You can edit data on the following dialog box shown as below.
- (2) Clear Item: All the items of selected PT are cleared.

After executing this function all the items are shown as blank.

- (3) Clear All Items: While above function "Clear Item" clears data for one selected order, this function clears data for all the orders of 256 Position Table.
- (4) Cut Item: Used to cut selected item data of PT in order to paste on other position.
- (5) Copy Item: Used to copy selected item data of PT in order to paste on other position.
- (6) Paste Item: Paste the copied data to clipboard by "Cut" or "Copy" to other selected position.
- (7) Run Item: Execute motion order from the selected No. of Position Table.



Double click on selected line of Position Table data or click the "Edit Item" from popup menu button shown above figure, then the dialog box shown right is activated.

Once complete editing of each item, and then you move and select other items to edit by using right/left arrow key.

After complete editing of all data completely, click 'Save' button to save data to RAM. In order to save data to ROM area, click Save to ROM' button on main screen of Position Table.

PT Item Editor	PT Item Editor	PT Item Editor		
Command ABS - Normal Motion -	Command ABS - Normal Motion -	Command ABS - Normal Motion -		
Motion Jump PT Output	Motion Jump PT Output	Motion Jump PT Output		
Position 32000 [pulse]	JP Table No. 1 📝 Next No.	PT Output Set		
Low Speed 1 [pps]	🗇 JPT 0	💿 Start Sign 💿 End Sign 💿 Pass Sign		
High Speed 250000 [pps]	_ JPT 1			
Accel Time 100 [msec]	🔄 JPT 2	Output		
Decel Time 100 [msec]	Counting Loop	PTO PTI PT2		
	Loop Count	Pass Sign		
	JP Table No, at the end of loop	Trigger Position 0 [pulse]		
Check Inposition		Trigger Time 0 [msec]		
Waiting time after command				
0 [msec]	Clear Loop Count			
	JP Table No.			
Write Cancel	Write Cancel	Write Cancel		



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# 3. Position Table Item

### 3.1 Explanation of Position Table Item

Designated Item	Description	Unit	Lower limit *1	Upper limit *1	
Command	Specifies type of motion. For more details, refer to <sup>r</sup> 3.2 Command <sub>J</sub> .	-	0	9	
Position	Specifies position/movement scale by number of pulse.	pulse	-2,147,483,648	+2,147,483,647	
Low Speed	Specifies low speed by number of pulse in accordance with type of motion. For more details, refer to <sup>r</sup> 3.2 Command <sub>j</sub> .	pps	1	35,000	
High Speed	Specifies high speed by number of pulse in accordance with type of motion. For more details, refer to <sup>r</sup> 3.2 Command <sub>J</sub> .	pps	1	800,000*1 500,000*2	
ACC time	Specified acceleration time by msec when starting motion.	ms	1	9,999	
DEC time	Specified acceleration time by msec when stopping motion.	ms	1	9,999	
Speed High Speed Low Speed ACCtime DEC time					
Wait time	Specifies waiting time by msec for starting motion of next PT when specifying PT No. for jump/skip. If JP Table No is specified as blank, this is ignored.	ms	0	60,000	

\* 1 : DS-CL28-SA

\* 2 : DS-CL42-SA



Speed High Speed Low Speed Walt time						
<b>1</b> Notes Even if Wait Time is specified as 0[ms], the system waits for the completion signal of position setting (INP signal) or motor stop signal before starting next Position Table						
JP Table No.	When this item specified, the system jumps to JP Table No and execute it after completing action of current position. If Position No is specified as 10XXX, system jumps to Position No XXX as soon as'JPT Start'begins, one of the input digital signal from controller to outside, becomes	-	0	255		
	ON. For program exit, specify as blank. For more details, refer to <sup>r</sup> 4.4 Input Condition – Jump <sub>J</sub> .		10,000	10,255		
JPT 0	If any of these items is checked and there are	_	0	255		
	corresponding input signals of JPT input0, JPT input1 or JPT input2 system jumps to JPT 0		10,000	255		
JPT 1	JPT 1 or JPT 2 accordingly regardless of specified 'Jump		10,000	10,255		
JPT 2	For more details, refer to <sup>1</sup> 4.4		0	255		



	Input signal	Corresponding	i Input Jun	np Position	
	JPT input0	Input Jur	np Positior	NO O	
	JPT input0	Input Jur	np Positior	1 No 1	
	JPT input0	Input Jur	np Positior	n No 2	
Loop Count	If these item a system repeats a position under sp (Loop Count) an	are specified, action of the pecified times ad after then	-	0	
Loop Jump	jumps to correspo to Loop Jump regardless of sp Table No'.	nding position Table No ecified 'Jump		0	
Table NO.	For more details, refer to <sup>r</sup> 4.5.1 Loop Setting.			10,000	
PT set	Note) ALL28 V2 does not support this functions.			-	
Loop Counter Clear	If this item is checked, Loop Count of specified no of PT is to be cleared. For more details, refer to [4.5.1 Loop Setting]		_	0	
Check Inpos	If this item is checked, stop condition is recognized as Inposition finishes.		-	0	
Trigger Pos	Note) ALL28 V2 does not support this functions		-	_	
Trigger Time	Note) ALL28 V2 of support this	loes not functions.	-	-	

\*1 : The unit of [pps] in this item is referenced to 16,000/revolution encoder.



### 3.2 Type of Command

Item "Command" specifies type of action pattern to be executed for each position and the followings in the table are list of commands.

Command Name	Specified Value	Remark
Abs Move low speed.	0	
Abs Move high speed	1	I ne value in the item "Position" is value for absolute position
Abs Move high speed with deceleration.	2	'Teaching'function can be used.
Abs Move with acceleration and deceleration.	3	'Continuous Action'function can be used.
Inc Move low speed.	4	
Inc Move high speed	5	The value in the item "Position" is value
Inc Move high speed with deceleration.	6	for relative position.
Inc Move with acceleration and deceleration.	7	'Teaching'function is not supported. 'Continuous Action'is not supported.
Move to Origin	8	Execute the command to move to origin based on the specified current parameters specified.
Clear Position	9	Reset 'command position' value and 'actual position' value based on current position and clears the values as 0.

The following table shows speed patterns for each action of command.

Command Name	Specified Value	Speed Pattern
Abs Move low speed.	0	Low speed
Inc Move low speed.	4	
Abs Move high speed	1	High speed
Inc Move high speed	5	│
Abs Move high speed with deceleration.	2	High speed
Inc Move high speed with deceleration.	6	│
Abs Move with acceleration and deceleration.	3	High speed
Inc Move with acceleration and deceleration.	7	



# 4. Execution of Position Table

When installing User Program(GUI), the following files are saved in the folder named as "\DINGS\Ezi-MOTION Plus-RnE\PT Samples\_PlusR\ DS-CL28/42" as sample files to test Position Table.

1) General Motioning.txt, 2) Loop Motioning.txt, 3) Loop counter clear.txt, 4) Clear Position.txt

### 4.1 How to Start Position Table

Position Table operation is executed by input signal or communication command. The followings are example of Position Table operation by input signal to be explained step by step.

In the case of Position Table operation by communication command, the system is executed by sending the communication commands corresponding to the control input signal.

- 1. Specify Position Table No (0~255) operated by PT A0~PT A7.
- 2. If the motor is Servo OFF, click Servo ON.
- 3. Signal ON of PT Start input to start operation.

### 4.2 Example for General Operation

Specify PT No through input data for PT A0 ~ PTA7 and then input 'PT Start' signal to start speed control operation.

#### [Specifying Position Table]

P T No	Command type	Position	Low Speed	High Speed	Accel time	Decel. time	Wait time	Continuous Action	JP Table No.
0	3	10000	1	2500	50	300	0	1	1
1	3	1000	1	500	-	-	0	1	2
2	3	5000	1	1500	50	300	300	0	3
3	3	-2500	1	1000	300	300	0	0	-



\* Refer to the sample file for testing Position Table, 'PT sample (General Motioning).fpt'.



#### C **Operation Modes** 4.3 Position Table commands can be executed by two modes as follows. 4.3.1 Normal Position Table Mode Port 12 S RUN STOP Normal Single Step Position Table Wait Time JP T No CMD Position Low Spd High Spd Accel Decel Check Inpos n

Select 'Normal' at the main window of position table, and all commands will be executed in order by conditions already loaded in PT data.

- (1) While Normal mode is selected, the user sets PT number to 0 and click 'Run' and then PT 0 is executed.
- (2) PT 1 is executed by PT data jump conditions.
- (3) PT 2 is executed by PT data jump conditions.
- (4) As mentioned above, next PT number is automatically executed by position data jump conditions.
- (5) Click 'Stop' to stop operating.



#### 4.3.2 Single Step

Select 'Single Step' at the main window of position table, and only corresponding PT command will be executed and next PT commands will be on stand-by. This mode can be easily used when the user executes testing for each position command. And it is available for User Program(GUI) only.

Mode D N	e ormal	Singl	e Step	RUN		ST	OP	Port 1	2 SI		
Vositi No,	CMD	e Position	Low Spd	High Spd	Accel	Decel	Wait Time	Check Inpos	JP Tal	2	
1	3	25000	1	10000	100	100	1000		2 -	,	Neur
1	3 3	25000 0	1	10000	100 100	100 100	1000 1000		2	Ž	Next
1 2 3	3 3 3	25000 0 25000	1 1 1	10000 10000 50000	100 100 100	100 100 100	1000 1000 1000		2 3 <b>(</b> 4	• ()	Next
1 2 3 4	3 3 3 3	25000 0 25000 0	1 1 1 1	10000 10000 50000 50000	100 100 100 100	100 100 100 100	1000 1000 1000 1000		2 3 4 5	3	Next
1 2 3 4 5	3 3 3 3 3	25000 0 25000 0 2500	1 1 1 1 1	10000 10000 50000 50000 100000	100 100 100 100 100	100 100 100 100 100	1000 1000 1000 1000 1000		2 = 3 4 4 5 6	3	Next
1 2 3 4 5 6	3 3 3 3 3 3	25000 0 25000 0 2500 5000	1 1 1 1 1	10000 10000 50000 50000 100000 100000	100 100 100 100 100 100	100 100 100 100 100 100	1000 1000 1000 1000 100 100		2 3 4 5 6 7	3	Next

- (1) While Single Step Mode is selected, the user sets PT number to 0 and click 'Run' and then PT 0 is executed.
- (2) After execution is stopped, 'Run' icon is changed into 'Next' and next command is on stand-by.
- (3) Click 'Next' button, and PT 1 will be executed.
- (4) When pressing each 'Next' button, one PT command is executed.
- (5) Click 'Stop' to stop operation. After operation is stopped, the user can set new PT number and click 'Run' button to start the program again.



### 4.4 Teaching Function

Teaching signal functionalizes that the position value[pulse] being working can be automatically inputted into a 'position' value of a specific position table. The following table shows type of commands and whether teaching function can be used or not.

Command Name	Value	To be used or not
Abs Move low speed.	0	'Teaching' can be used
Abs Move high speed	1	reaching can be deed.
Abs Move high speed with deceleration.	2	
Abs Move with acceleration and deceleration.	3	
Inc Move low speed.	4	'Teaching' cannot be used
Inc Move high speed	5	rouching cannot be used.
Inc Move high speed with deceleration.	6	
Inc Move with acceleration and deceleration.	7	
Move to Origin	8	
Clear Position	9	



#### 4.4.1 Teaching by User Program

When click 'Teaching' button on Position Table screen, the following dialog box is activated.

		Positio	on Status		<b>(4)</b>
	10000 [pulse]	Cmd	Pos	[pulse]	
ed	10000 [pps]	Actu	al Pos	[pulse]	1
400 14-		Actu	al Vel d	[pps]	
ABS MOW	2	Pos	Error	0 [pulse]	. 5
Move	INC Move		Positi	ion Save	2
og	*Jog				
	ABS Move	ABS Move INC Move log +Jog	10000 [pulse]     Cmd       ied     10000 [pps]     Actu       ABS Move     Actu       Move     INC Move       iog     +Jog	10000 [pulse] Cmd Pos Image: Cmd Pos   red 10000 [pps] Actual Pos Image: Cmd Pos   ABS Move Actual Vel Image: Cmd Pos Image: Cmd Pos   Move INC Move Pos Error Image: Cmd Pos   INC Move Image: Cmd Pos Position	10000 [pulse] Cmd Pos 0 [pulse]   eed 10000 [pps] Actual Pos 0 [pulse]   ABS Move Actual Vel 0 [pps]   Move INC Move Pos Error 0 [pulse]

- Select Position Table No, the figure shows that no 6 of PT is selected among 256 Position Tables.
- ② Specify position of motor where to teach and move it.
- ③ Turn ON or OFF of Servo during teaching.
- ④ Displays current position information and the value displayed in "Actual Pos(ition)" is to be teaching value.
- (5) When clicking this "Teaching" button, current value displayed in "Actual Pos" will be saved in the item "Position" of the current PT (No 6 above case). The values are to be saved on RAM and click 'Save to ROM' button in order to save on ROM.
- (6) In order to move to the next position, select PT no by using arrow keys.



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### 4.5 Input Condition Jump

Among the items to be specified, "JP Table No.", "JPT 0", "JPT 1"and "JPT 2" are used to specify next PT no. to be executed. Specified next PT no. to be executed, there are two different methods depending on the control signal as followings:

#### 4.5.1 Automatic Jump

This is the method to specify next action pattern (PT no.) by input condition. System jumps to next PT no. to be executed automatically according to procedure.

For example as shown in the following figure, when PT no. 14 is executing, 1) if there is no input signal, next action pattern is to be executed by PT no. 15 as shown in figure 1).

However, if any of input signal is ON such as JPT Input0, JPT Input1 or JPT Input2 during the operation of PT no. 14, then system jumps to JPT 0, JPT 1 or JPT2 accordingly and execute it that is specified in the Position Table data as shown in the figure 2) ~ 4).



\* Refer to the sample file for testing Position Table, 'PT sample (Loop Motioning).fpt'.



#### 4.5.2 Jump by External Signal

This is the method to specify next action pattern (PT no.) by input condition. However, system does not jump to next PT no. to be executed automatically according to procedure, but executed by external signal ("JPT Start").

Difference from the function in 'section 4.5.1'executed by input signal JPT Input0~Input2

- (1) Jump Position No to jump need to have the format of 10XXX and
- (2) 'JPT Start' needs to be [ON] in order to execute the next action.

If specified "Wait Time" of PT data is more than 0, then the next action is to be executed after the specified time from the external signal.



\* If more than 2 signals become [ON] of 3 'Input Jump Position No0 ~ Input Jump Position No2', the lower number (JPT0 > JPT1 > JPT2 ) has the high-priority and will be executed.



C

### 4.6 Loop Condition Jump

#### 4.6.1 Specifying Loop

If [Loop Count] and [Loop Jump Table No] are specified, system repeats the action of position specified times (Loop Count) and then jumps to corresponding position to [Loop Jump Table No.] regardless of specified [Jump Position No], that is, [Jump Position No] is ignored.

There are rules in specifying loop as following:

- (1) If '0'is specified for [Loop Count], loop function is cancelled.
- (2) If system needs to jump before repeating the specified times, it jumps to JP Table No.
- (3) If 'blank' is specified for [Loop Jump Table No], system exits in execution.
- (4) If [Loop Jump Table No] is specified in the form of 10XXX, next action is executed by the external signal "JPT Start".

Following Table is one of example for specifying loop.

DT No	Movement	Position Table	No of Loop	Position Table No to	Loop Counter Clear	
	Scale	No to jump	(Loop	jump after completing loop	(Loop Counter	
(CIND)	(Position)	(JP Table No.)	Count)	(Loop Jump Table No)	Clear)	
0	8000	1	0	0	-	
1	4000	0	2	2	-	
2	0	0	3	-	1	



\* Refer to the sample file for testing Position Table, 'PT sample (Loop Motioning).fpt



#### 4.6.2 Loop Counter Clear

"Loop Counter" is internal counter in drive to compare no. of repeat with the no. specified in the item "Loop Count" of PT data.

This function clears "Loop Counter" to 0 (zero) of the specified PT data after completion of looping. If [Loop Count Clear] is specified as blank, this function is cancelled.

PT No <b>(CMD)</b>	Movement Scale (Position)	Position Table No to jump (JP Table No.)	No of Loop (Loop Count)	Position Table No to jump after completing loop <b>(Loop Jump Table No)</b>	Loop Counter Clear (Loop Counter Clear)
0	8000	1	0	0	-
1	4000	0	2	2	-
2	0	0	0	0	1

Following table shows an example of specifying Loop Counter Clear

- (1) Specify "Loop Counter Clear" of PT No 2 as PT No '1'.
- (2) Start operation from PT No 0. When starts operation, system reset all "Loop Count" values as 0 (zero).
- (3) After repeats the loop block PT No 0 ~ PT No 1 two times, the "Loop Counter" becomes 2 (two) same as specified "Loop Count" so system completes looping and jumps to PT No 2.
- (4) After executing PT No 2, system jumps to PT No 0. Before jumping to PT No 0, system clears "Loop Counter"- the internal counter as 0 (zero). (5) Then paragraph (3) and (4) are repeated infinitely.
- (6) If the "Loop Counter Clear" of PT No 2 was not specified, "Loop Counter" increased continuously and so jumping to PT No 2 occurs only once at the first time and then repeats the loop block PT No 0 ~ PT No 1 infinitely because the internal counter "Loop Counter" value will never meet the specified "Loop Count" value.





\* Refer to the sample file for testing Position Table, 'PT sample (Loop counter clear).fpt.



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