



VER 1.0

# Technical Manual

**DS-CL28-SA / DS-CL42-SA**



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# 1. Safety Pre-caution and Note on Installation



## ※ Before Operation

- Thank you for purchasing our DS-CL28/42-SA series.
- DS-CL28/42-SA series are a high-performance 32bit ARM chip embedded Full Digital position control stepping driving unit.
- This manual describe the handling, maintenance, repair, diagnosis and troubleshooting of DS-CL28/42-SA series.
- Before start operation of DS-CL28/42-SA, thoroughly read this manual.
- After reading this manual, keep the manual near DS-CL28/42-SA, so that any user can read this manual whenever needed.

## 1.1 Precaution

### ◆ General Precautions

- Contents of this manual are subject to change without prior notice for functional improvements, change of specifications or user's better understanding. Thoroughly read is the manual which is provided with purchased DS-CL28/42-SA
- In case of manual is damaged or lost, please contact with DINGS' agent or our company at the address on the last page of this manual.
- DINGS' is not responsible for a product breakdown due to user's dismantling for the product, and such a breakdown is not guaranteed by the warranty.


### ◆ Safety Precaution

- Before installation, operation, repairing the products, thoroughly read the manual and fully understand the contents. Before operating the products, please understand the mechanical characteristics of this products and related safety information and precautions.
- This manual divides safety precautions into **Attention** and **Warning**.



	<b>Attention</b>	If user does not properly handle the products, the user may seriously or slightly injured damages may occur in the machine.
	<b>Warning</b>	If user does not properly handle the products, a dangerous situation (such as an electric shock) may occur resulting in deaths or serious injuries.

- Although precaution is only a **Attention**, a serious result could be caused depending on the situation. Follow safety precaution.



## ◆ Check the Product

	<b>Attention</b>	<p>Check the Product is damaged or parts are missing. Otherwise, the machine may get damaged or the user may get injured.</p>
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## ◆ Setting

	<b>Attention</b>	<p><b>Please carry the DS-CL28/42-SA carefully.</b> Otherwise, the product may get damaged or user's foot may get injured by dropping the product.</p> <p><b>Use non-flammable materials such as metal in the place where the DSCL28/42-SA is to be installed.</b> Otherwise, a fire may occur.</p> <p><b>When installing several DS-CL28/42-SA in to be sealed place, install a cooling fan to keep the ambient temperature of the product as 50°C or lower.</b> Otherwise, a fire or other kinds of accidents may occur due to overheating.</p>
	<b>Warning</b>	<p>The process of installation, Connection, Operation, Checking and Repairing should be done by qualified person. Otherwise, a fire or other kinds of accidents may occur.</p>


## ◆ Connect Cables

	<b>Attention</b>	<p><b>Keep the rated range of input Voltage for drive.</b> Otherwise, a fire or other kinds of accidents may occur. <b>Cable connection should be following the wiring diagram.</b> Otherwise, a fire or malfunction of machine may occur.</p>
	<b>Warning</b>	<p><b>Before connecting cables, check if input power is off.</b> Otherwise, an electric shock or a fire may occur.</p> <p><b>The case of this DS-CL28/42-SA is installed from the ground of the internal circuit by the condenser, Please Ground the DS-CL28/42-SA.</b> Otherwise, an electric shock or a file may occur and a cause of malfunction of machine.</p>

## ◆ Operation & Setting Change

	<b>Attention</b>	<p><b>If a protection function (Alarm) occurs, firstly remove its cause and then release (Alarm reset) the protection function.</b> If you operate continuously without removing its cause, the machine may get damaged or the user may get injured.</p> <p><b>Make all input signals to OFF before supply input voltage to drive.</b> The machine may get damaged or the user may get injured by motor operation.</p> <p><b>All parameter values of DS-CL28/42-SA are set by default factory setting value. Change this value after reading this manual thoroughly.</b> Otherwise, the machine may get damaged or other kinds of accidents may occur.</p>
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◆ Check & Repair

	<b>Warning</b>	<b>Stop to supply power to the main circuit and wait sufficient time before checking or repairing this DS-CL28/42-SA</b> Electricity remaining in the condenser may cause of electric shock.
		<b>Do not change cabling while power is being supplied.</b> Otherwise, the user may get injured or the product and machine may get damaged.
		<b>Do not reconstruct the DS-CL28/42-SA</b> Otherwise, an electric shock may occur or the product and machine get damaged. And the reconstructed product cannot get after service.

## 1.2 Note on Installation

- (1) This product has been designed for indoor uses. The ambient temperature of the room should be 0°~ 55°C .
- (2) If the temperature of drive case is 50°C or higher, radiate heat outside for cooling down.
- (3) Do not install this product under direct rays or near magnetic or radioactive objects.

## 2. Specifications of the Drive

### 2.1 Characteristic Table

Type of Drive		DS-CL28-SA series	DS-CL42-SA series
Operating condition	Input Voltage	24VDC ± 10%	
	Control Method	Closed loop control with ARM-based 32-bit MCU	
	Multi Axes Drive	Maximum 16 axes through Daisy-Chain	
	Position Table	256 motion command steps (Move, Wait, Loop, Jump, External control, etc)	
	Current Consumption	Max. 500mA ( Except motor current )	
	Ambient Temperature	In Use : 0~40°C In Storage : -20~70°C	
	Humidity	In use : 35~85%RH (Non- condensing) In Storage : 10~90%RH (Non-condensing)	
Function	Vib. Resist.	0.5G	
	Rotation Speed	0~3,000 [rpm]	
	Resolution [P/R]	500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 16,000 (Available to set by the paramter) <sup>*1</sup>	500 1,000 1,600 2,000 3,600 5,000 6,400 7,200 10,000 (Available to set by the paramter) <sup>*2</sup>
	Protection Function	Over Current Error, Over Speed Error, Position Tracking Error, Over Load Error, Over Temperature Error, Over Regenerated Voltage Error, Motor Connect Error, Encoder Connect Error, In-Position Error, ROM Error, Position Overflow Error	
Function	LED Display	Power status, In-Position status, Enable status, Alarm status	

I/O Signal	In-Position Selection	0~63 (Selectable by parameter)	
	Position Gain Selection	0~63 (Selectable by parameter)	
	Rotational Direction	CW/CCW (Selectable by parameter)	
	RUN Current	50%~150% (Selectable by parameter)	
		RUN current is flowing current value in the motor when motor is operating ( rotating ), It is set based on constant current of motor * Default factory setting value : 100%	
	STOP Current	20%~100% (Selectable by parameter)	
		It is set as setting value of STOP current 0.1 sec after motor stop. STOP current value is at a ratio against RUN current value of motor * Default factory setting value is : 50%	
	Input Signals	4 programmable inputs (Photocoupler)	7 programmable inputs (Photocoupler)
	Output Signals	3 programmable outputs (Photocoupler),Brake	
	Communication Interface	The RS-485 serial communication Communication speed: 115,200 [bps]	
Position Control		Incremental mode / Absolute mode Data Range: -2,147,483,648 to +2,147,483,647 [pulse] Operating speed: Max. 3,000 [rpm]	
Return to Origin		Origin Sensor, Z phase, ±Limit sensor, Torque	
GUI		User Interface Program within Windows	
Software		Motion Library (DLL) for Windows XP/7/8/10	

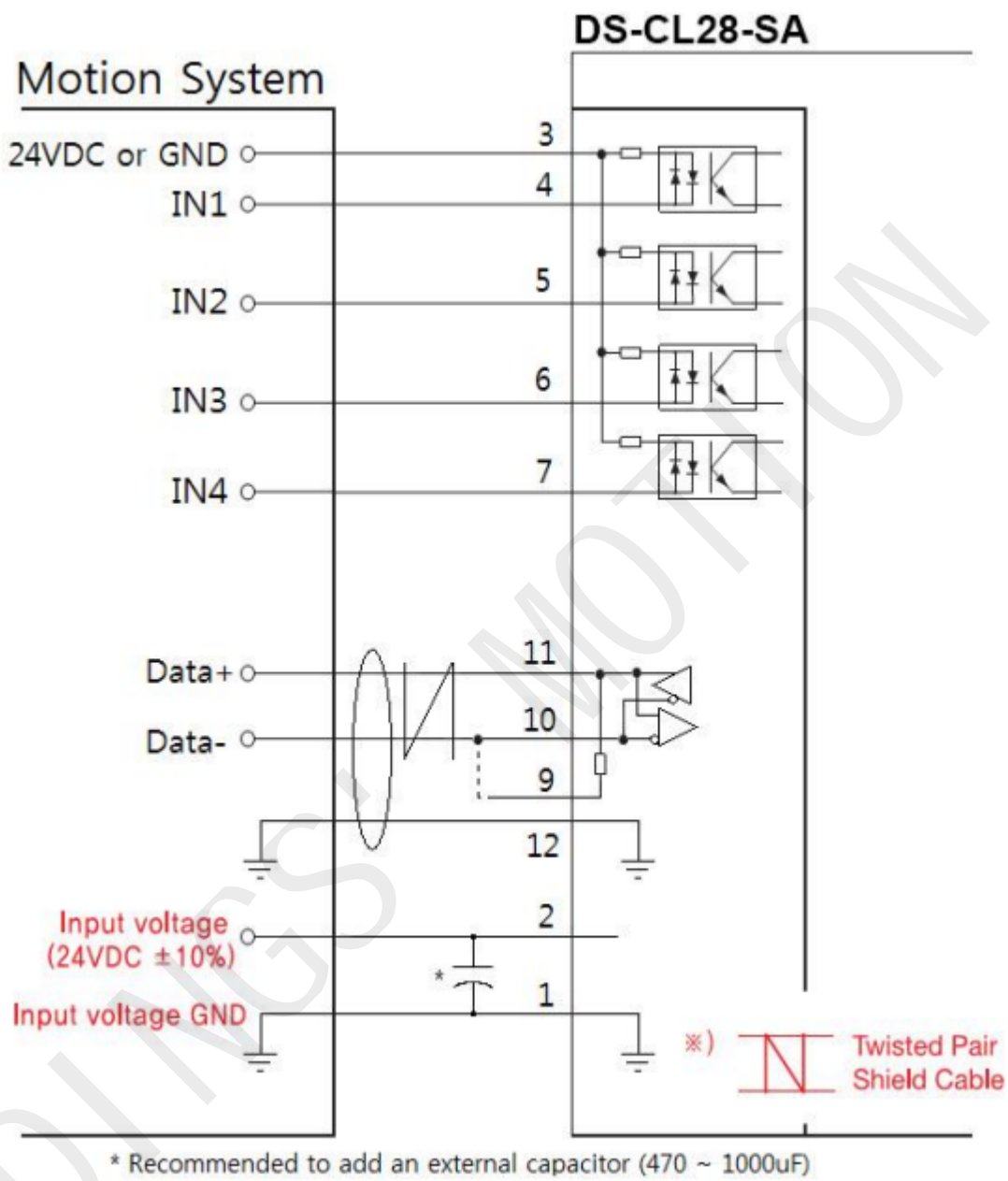
## 2.2 Controller Configuration

### ◆ DS-CL28/42-SA series configuration

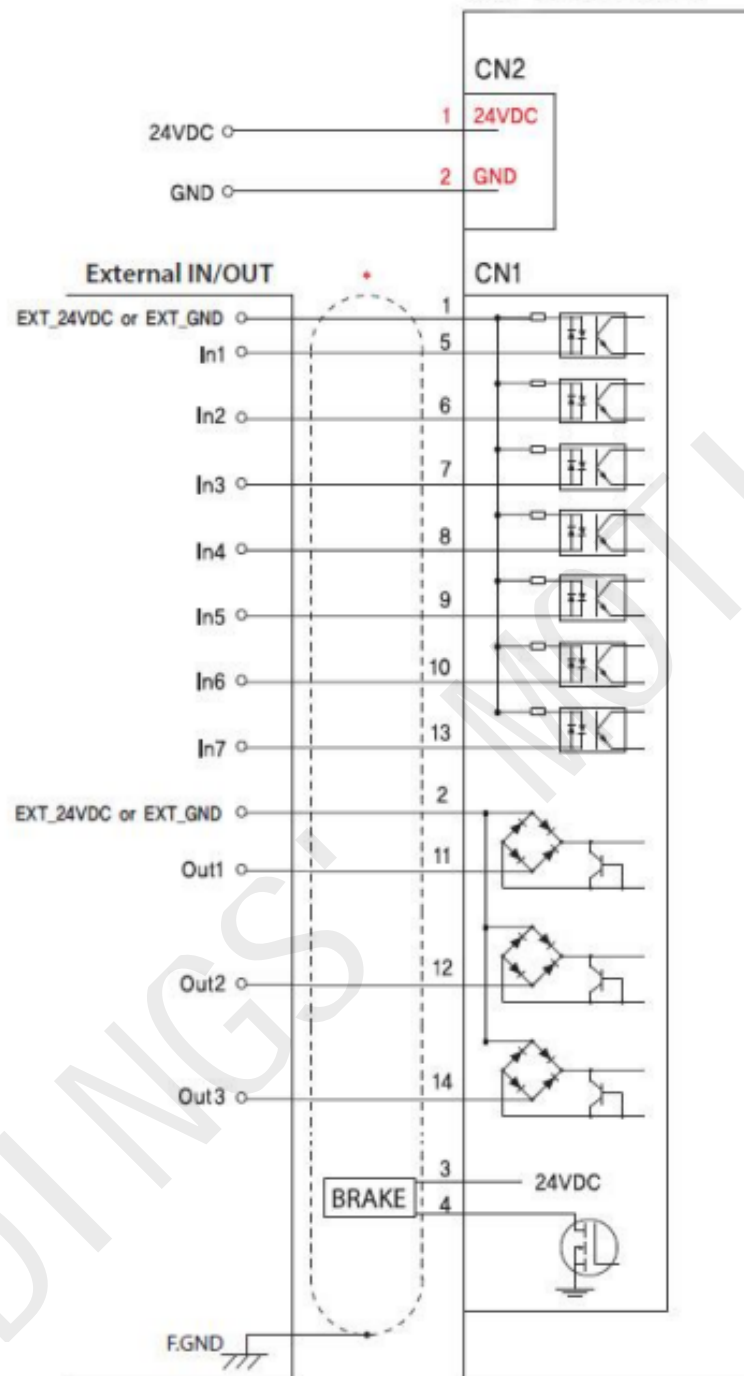




2.3 External Wiring Diagram

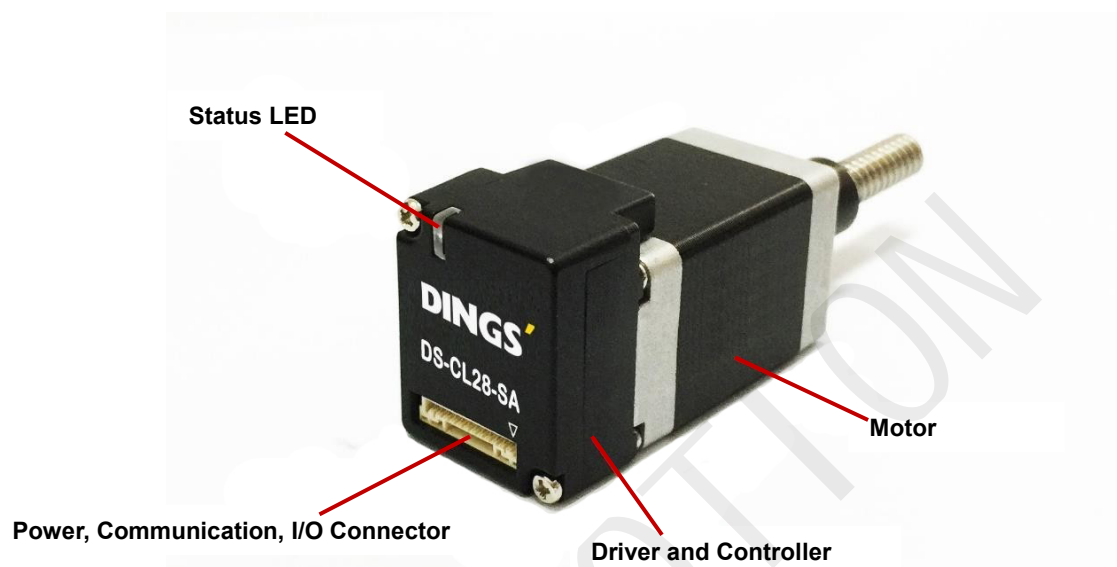


# DS-CL42-SA



## External Name and Function Setting of DS-CL28/42-SA

### 2.4 External Wiring Diagram



## 2.5 Drive Status LED



In case of DS-CL28/42-SA product, status of LED can be checked by turning on / off the status LED and flashing

Status	Function	LED status
Disable	Green : Red :	Green light flashing , Red light off
Enable	Green : Red :	Green light On , Red light off
Enable & Communication	Green : Red :	Green light On , Red light flashing
In Operation	Green : Red :	Green & Red lights On
In-position deviation	Green : Red :	Green & Red lights alternately flashing
Alarm	Green : Red :	Red light flashing repeat as many as alarm numbers

The following table shows the alarms according to the number of red LED flashes when an alarm occurs during operation

Times	Alarm name	Condition
1	Over Current Error	The current through power devices in drive exceeds 4.8A
2	Over Speed Error	Motor speed exceeds 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 90° in motor run state <sup>*1</sup>
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85°C
6	Over Regenerated Voltage Error	Back-EMF is higher than 48V
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error in Encoder connection of drive
10	In-Position Error	After operation is finished, a position error occurs
12	ROM Error	Error occurs in parameter storage device (ROM)
15	Position Overflow Error	Position error value is higher than 90° in motor stop state <sup>*2</sup>

<sup>\*1</sup> The setting value [pulse] in 'Pos Tracking Limit[No.24]' parameter

<sup>\*2</sup> The setting value[pulse] in 'Pos Error Overflow Limit[No.28]' parameter

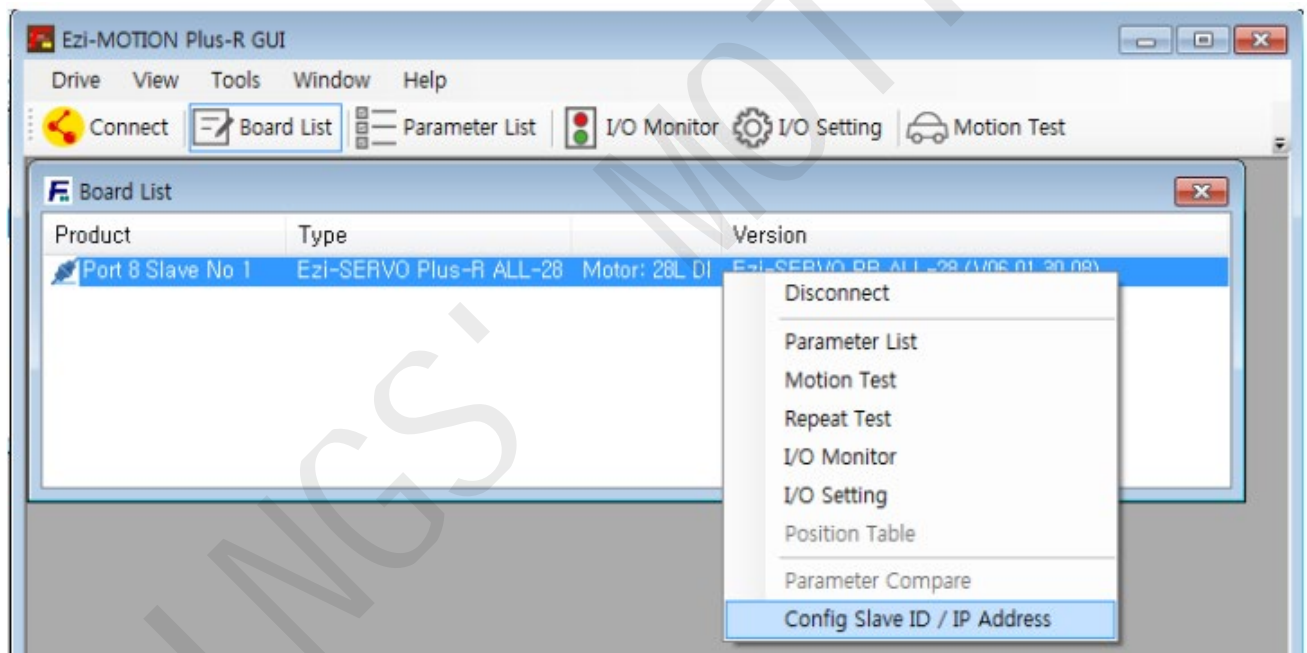
## 2.6 Network ID Setting



The Network ID of DS-CL42-SA can be set using the Ezi-MOTION Plus-R GUI.

The setting method is as follows.

- Connect the communication line to the product and input the power.
- Execute the Ezi-MOTION Plus-R program (version 6.40.12.18 or later).
- Select the port number of the computer connected to the product and set the communication speed to 115,200 [bps].
- Press the "Connect" button and wait for a while, the currently connected product is displayed in the Board List window.
- When right-click on the product which you want to modify, the menu appears. Then select to "Config Slave ID" and set it to the desired ID.



## 2.7 Termination Resistor Setting

Termination resistor is connected internally by connecting 9th and 10th of the connector of the product to the outside. In case of products which are connected at the end of the communication connection, set the termination resistor.



### Warning

The communication speed setting values of the drive modules connected in one segment should all be set to the same value (115,200 [bps]).

## 2.8 Power and I/O Signal Connector



### ◆ DS-CL28-SA I/O Signal Connector (CN1 : JST/BM12B-GHS-TBT)

No.	Signal name	Function
1	GND	Power GND
2	+24V (VDC)	Input Power
3	IO COMMON	Common terminal of IO input
4	IN1	User programmable input signal
5	IN2	User programmable input signal
6	IN3	User programmable input signal
7	IN4	User programmable input signal
8	Reserved	-
9	Termination	Termination resistor setting
10	Data- (B)	Communication signal (RS-485)
11	Data+ (A)	Communication signal (RS-485)
12	GND	Power GND (Communication signal GND)

### ◆ DS-CL42-SA I/O Signal Connector (CN1 : Molex/501465-1420)

No.	Function	Description
1	Input Common	Input Signal common terminal
2	Output Common	Output Signal common terminal
3	BRAKE+	Brake +24V
4	BRAKE-	Brake GND
5	IN1	User Input (User Input1)
6	IN2	User Input (User Input2)
7	IN3	User Input (User Input3)
8	IN4	User Input (User Input4)
9	IN5	User Input (User Input5)
10	IN6	User Input (User Input6)
11	OUT1	User Output (User Output1)
12	OUT2	User Output (User Output2)
13	IN7	User Input (User Input7)
14	OUT3	User Output (User Output3)

### ◆ DS-CL42-SA Power Connector (CN2)

NO.	Function	I/O
1	24VDC	Input
2	GND	Input



### 3. Control I/O Signal



#### 3.1 Signal Cabling

All control I/O signals use connector CN1 as specified below

##### 3.1.1 DS-CL28-SA : 4      programmable input = total 4 input pins

No.	Signal name	Function
5	IN1	Origin sensor signal, Positive Limit sensor signal Negative Limit sensor signal User input 0 ~ User input 8 (User IN 0 ~ User IN 8) Clear Pos, Soft Stop(Stop), Jog+, Jog-, Alarm Reset, Servo ON Origin Search, Emergency Stop(E-Stop)
6	IN2	
4	IN3	
7	IN4	

##### 3.1.2 DS-CL42-SA : 7      programmable input = total 7 input pins

No.	Signal	Function
5	IN1	Origin sensor signal, Positive Limit sensor signal Negative Limit sensor signal User input 0 ~ User input 8 (User IN 0 ~ User IN 8) Clear Pos, Soft Stop(Stop), Jog+, Jog-, Alarm Reset, Servo ON Origin Search, Emergency Stop(E-Stop)
6	IN2	
7	IN3	
8	IN4	
9	IN5	
10	IN6	
13	IN7	

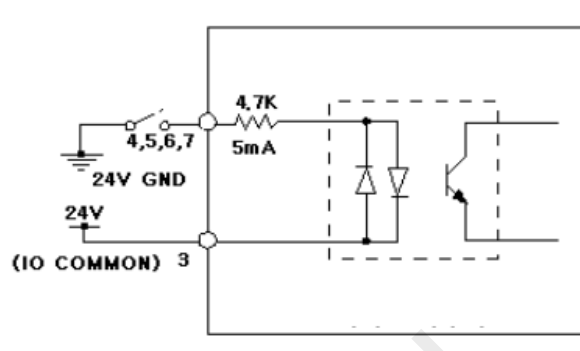
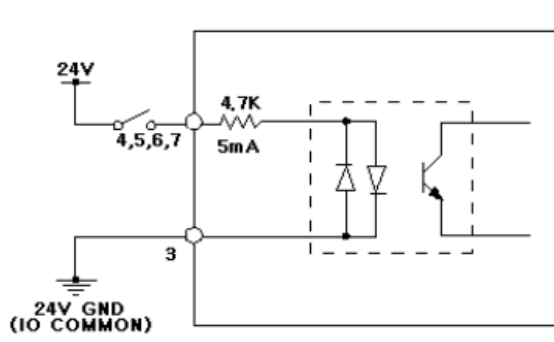
#### 3.2 Connection Circuit

All drive I/O signals are insulated by a photo coupler. The signals display the internal photo coupler status - [ON: Conduction] and [OFF: Non- Conduction], not the signal voltage level. Please refer to the following figure for wiring

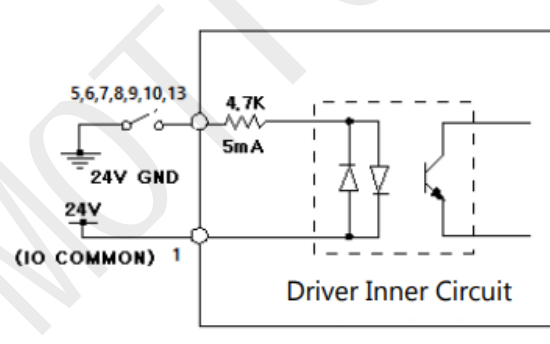
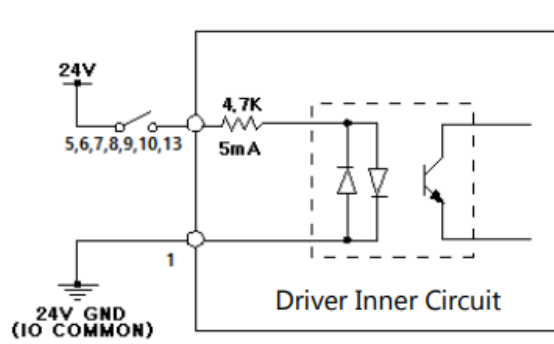
##### 3.2.1 Input Circuit

Input circuit power of DC24V±10% (consumed current : about 5mA/circuit) should be separately prepared.

DS-CL28-SA



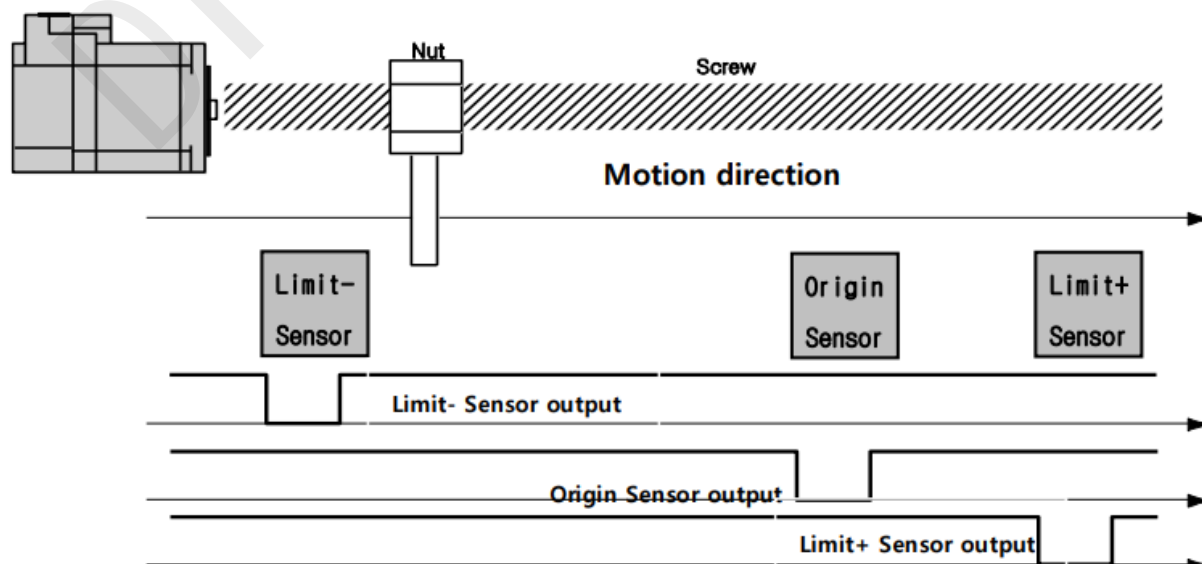
DS-CL42-SA



### 3.3 Input Signal

#### 3.3.1 Limit Sensor and Origin Sensor

Limit sensor and origin sensor are assigned to LIMIT+, LIMIT-, and ORIGIN pin in the CN1 connector respectively. LIMIT+ and LIMIT- sensors are used to limit the motion of each axis to prevent mechanical collision. Origin sensor is to set the origin of equipment





3.3.2 Clear Pos



This input signal sets the command position and the actual position to 0 in relation to motion position control. The reset signal pulse scale is 10ms or more.



Position value is to be “0” from the rising/falling edge of this signal

3.3.3 User Input Signal

The user input is connected to the IN1 pin of the I / O connector and the input status can be checked by the master controller. Input signals can be assigned to "User input 0" through "User input 8".

3.3.4 Position Table Start (PT Start) Input Signal

The position table supports the machine so that its motion can be controlled by I/O signals of central controller. It can directly transmit commands such as position table number, start/stop and origin return to the machine through the PLC. Also, the user can check output signals such as in-position, completion of origin return and Servo ready through the PLC.

[Position Table A0~A7] inputs are total 8 bits of input signal. It is used to set 256 position table numbers.

By using PT A0~A7 signals, the position table address can be set from 0 to 255 with a binary number. A0 is least significant bit and A7 is most significant bit. The following table shows how to assign position table number.

\* If ‘PT A0~A7’ signal is not connected when motioning by ‘PT Start’ signal, the position table number will be ‘0’

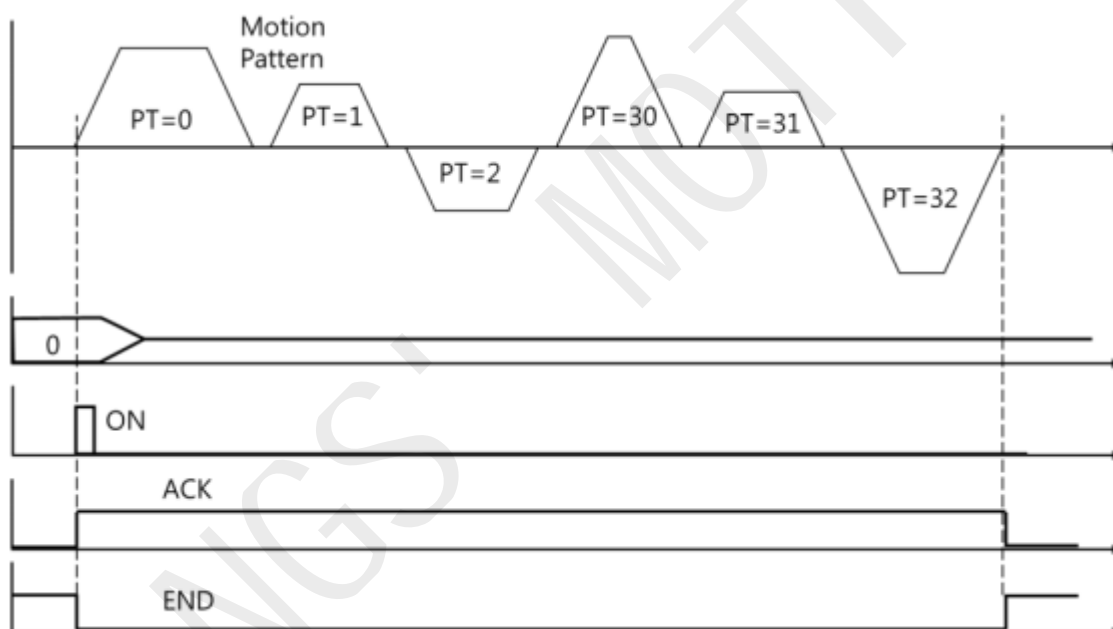
A7	A6	A5 ~ A3	A2	A1	A0	PT No.
0	0	0	0	0	0	0
0	0	0	0	0	1	1
0	0	0	0	1	0	2
0	0	0	0	1	1	3
.....						
1	1	1	1	1	0	254
1	1	1	1	1	1	255

### 3.3.5 Position Table Start (PT Start) Input

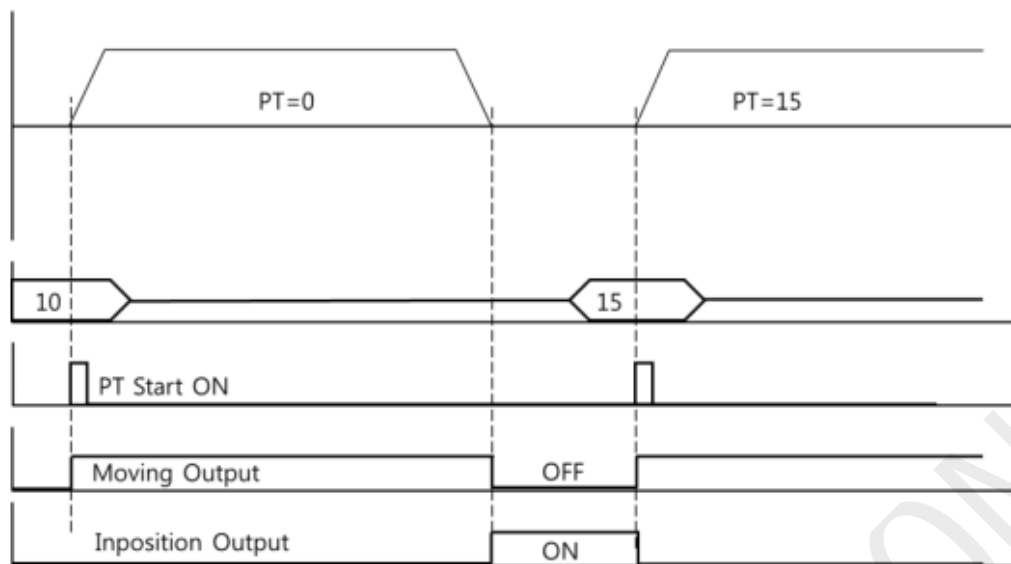


By using PT A0~A7 signals, it can be set the PT start number to be executed. Following example shows that total 6 motion patterns are executed sequentially starting from No.0 and motion is terminated after execution of No.32.

- (1) All of PT A0~A7 is set to '0' and PT number is set to '0'.
- (2) Set PT Start signal to [ON], and PT No.0 motion pattern will be executed.
- (3) When the motion pattern is started by PT, ACK signal and END signal are displayed to [ON] at output port as illustrated below. The signal is kept until one motion pattern loop is stopped. After all motions are stopped, the output signal level is set to [OFF]. \* DS-CL28-SA does not support these functions because it has no output port.
- (4) PT Start is edge triggered input and pulse duration must be is 10ms or more.



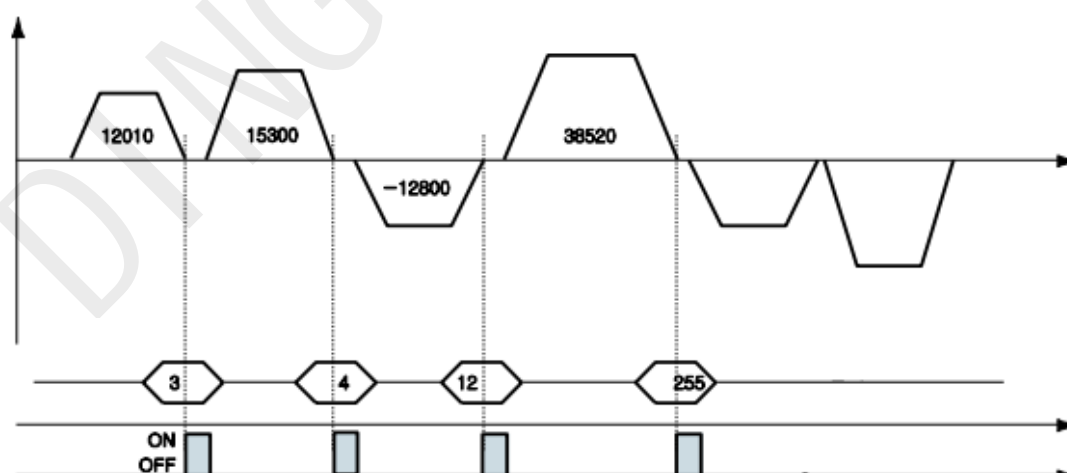
- \*1. PT A0~A7 signals must be set 50ms before PT Start signal is asserted.
- \*2. If the PT Start signal asserted when the PT A0~A7 signals are not assigned, the PT No. 0 will be executed.
- \*3. Checking the 'Moving' and 'Inposition' signals :  
Between sequential 'PT Start' command signal, the checking step for motion status (Moving, Inposition) is needed before next motion command.



### 3.3.6 Teaching Input

Teaching signal functions that the position value [pulse] being working can be automatically inputted into a 'position' value of a specific position table. If it is hard to calculate the exact moving distance (position value) of specific motion mechanically, the user can measure and set the distance (position value) easily by using this signal.

- (1) By using User Program (GUI), set a command type of corresponding PT number among 4 kinds of absolute moving commands (Absolute Move).
- (2) By using input signal (PT A0~A7), select corresponding PT number.
- (3) When Teaching signal is set to ON, the position value [pulse] is save to the position value of corresponding PT. At this time, it becomes the absolute position value.
- (4) Teaching signal pulse scale is 10ms or more.



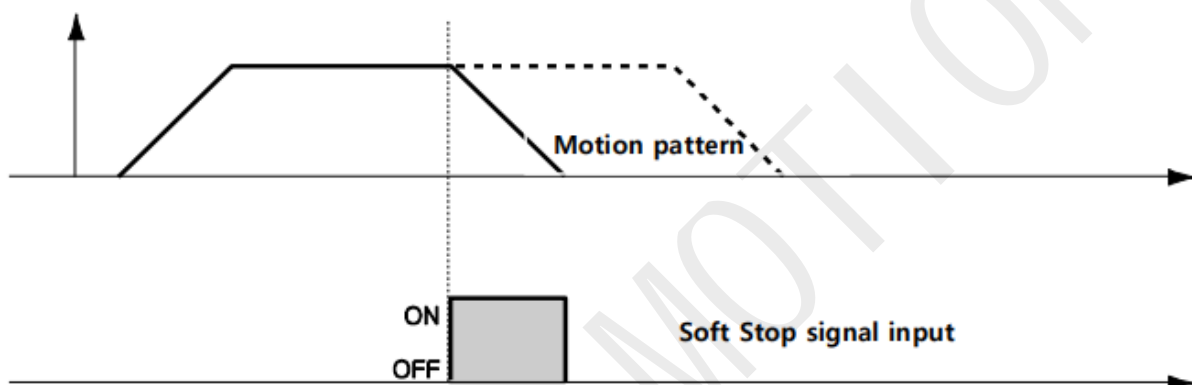
PT No.	Position Value [pulse] of Corresponding PT
3	12010
4	15300
12	-12800
255	38520

- After executing Teaching, click 'Refresh' icon, and the position value will be displayed to the position table.
- Click 'Save to ROM' icon, and the position value will be saved to the ROM area.
- Teaching signal can be used by two methods; the user assigns actual signal to the mot or, or he clicks 'Teaching' icon at the 'I/O Monitoring' window of User Program(GUI).

### 3.3.7 Stop Input

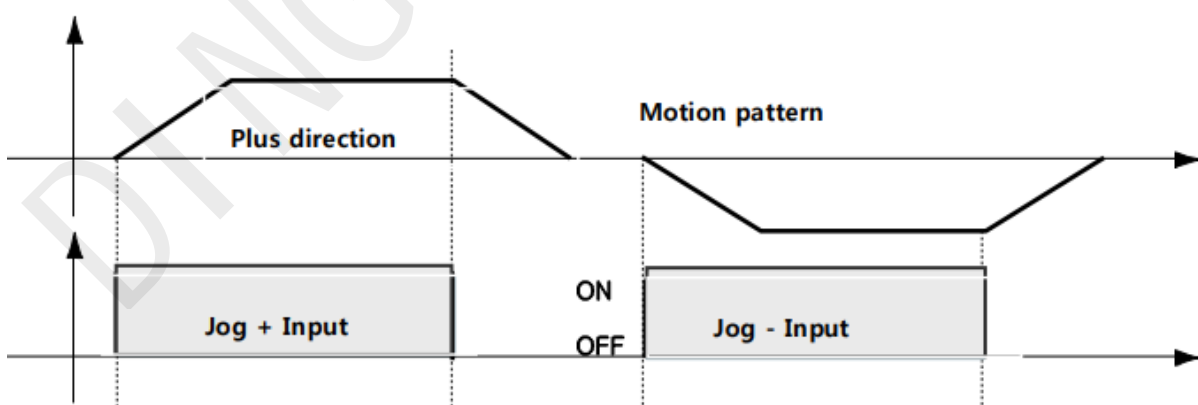


Soft stop input signal is to stop motion patterns under operation. The deceleration condition until they stop complies with the deceleration time value and the start speed value set previously. The soft stop signal is active in ON level and pulse scale is 10ms or more.



### 3.3.8 Jog+ and Jog- input

When Jog+ or Jog- signal is ON, the motor rotates clockwise or counterclockwise until it reaches the hardware limit or the software limit. Jog motion pattern is subject to jog related parameters (No.7: start speed, No.6: speed, No.8: Acc Dec time).



### 3.3.9 Servo ON and Alarm Reset Input

When the protective function of drive executes, alarm output is activated. When Alarm Reset input is set to ON, alarm output and alarm blink output are released. Before releasing alarm output, the user must remove any cause of alarm.

When Servo ON/OFF signal is set to OFF, the drive stops supplying the current to the motor and so the user can directly adjust the output position. When Servo ON/OFF signal is set to ON, the drive

restarts to supply the current to the motor and its torque is recovered. Before operating the motor, the user must set it to ON.

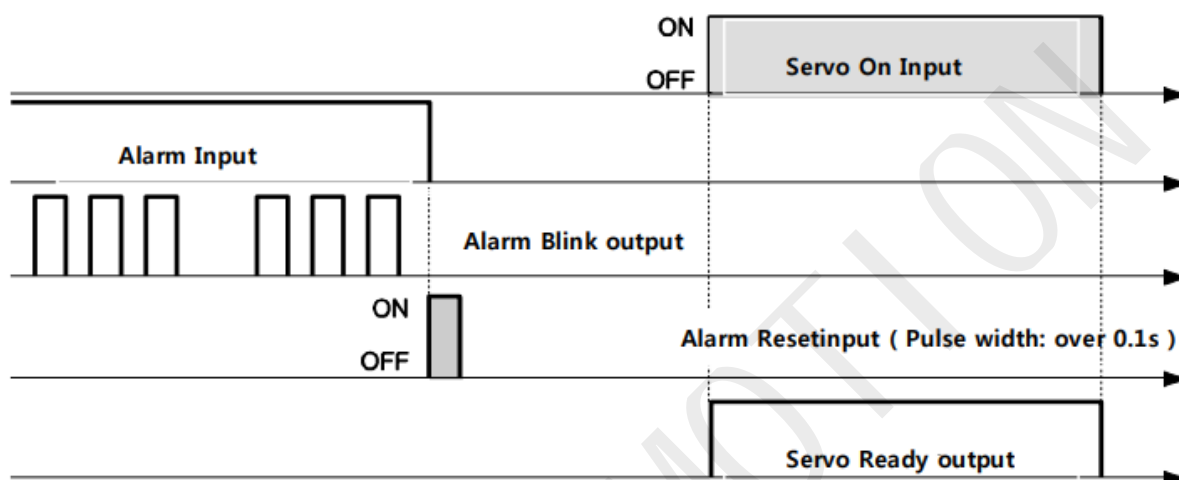
When the drive is set to Servo ON, [ServoReady] signal is set to ON.

Servo ON signal is edge trigger type and pulse duration is 10ms or more.

!

Warning

If the 'Servo ON' signal is assigned to input pin, Servo ON Command from GUI or DLL library will not executed.

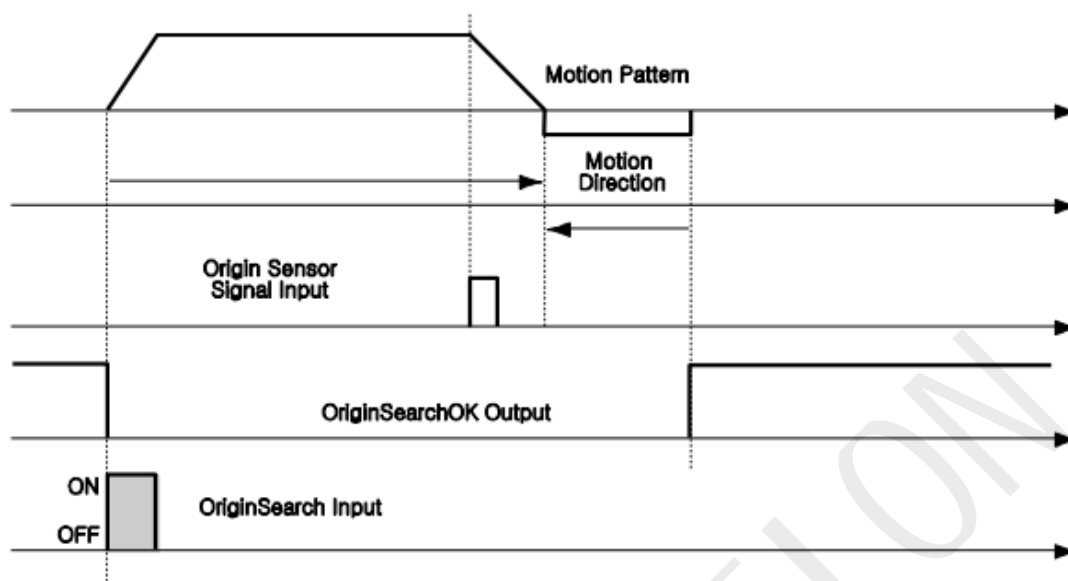


- If 'No.0: Pulse per Revolution' in the parameter list is changed, the motor is set to Servo OFF.
- 2. After 'ServoON' signal is assigned to input pin, it is impossible to use 'SERVO ON' button in User Program(GUI).
- 3. After 'ServoON' is executed, the 'Command Position' value will be changed as same as 'Actual Position' value to remove 'Position Error'.

### 3.3.10 Origin Search Input

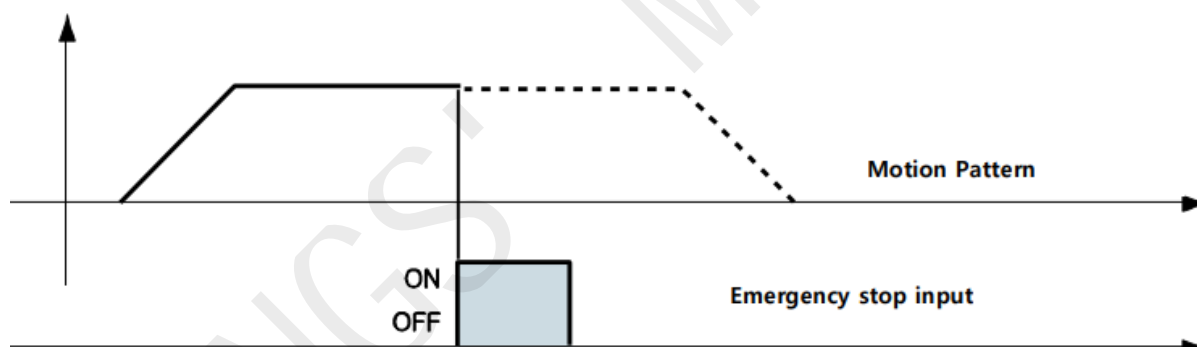


When 'Origin Search' signal is set to ON (10ms or more), it starts to search the origin position according to selected conditions. The conditions are subject to parameters such as No.20:Org Method, No.17:Org Speed, No.18:Org Search Speed, No.19:Org AccDec Time, No.21:Org Dir. (For more information, refer to '1.2 Parameter'.) When the origin search command is completed, 'Origin Search OK' signal is set to ON.



### 3.3.11 E-Stop Input (Supporting Ver 06.01.30.05 or later)

When [Emergency stop] signal is set to [ON] the current motion is stopped immediately without deceleration. E-Stop signal is active in ON level and pulse scale is 10ms or more.



### 3.3.12 JPT Input 0 ~ Input 2 (Jump Position Table Input) Input

Select motion pattern (position table number) to be subsequently executed according to input signal conditions.

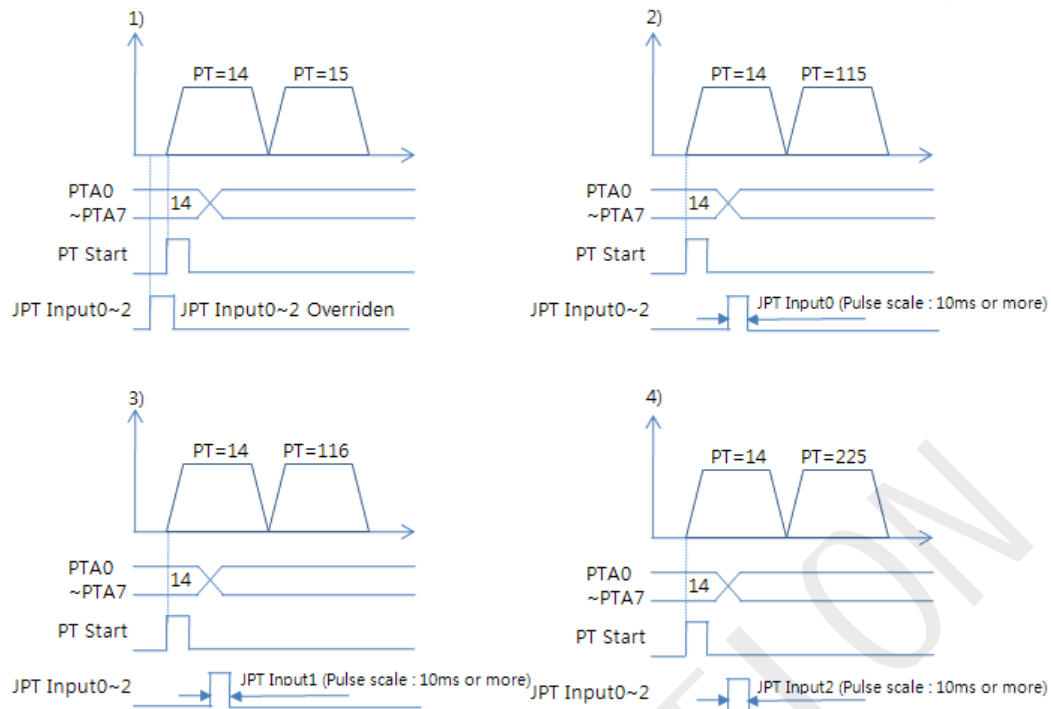
**Ex**

**Example**

becomes PT 15 as shown in Figure 1). However, if 'JPT Input0~Input2' input signal is set to ON while PT 14 is executing, each corresponding position number is executed as shown in Figure 2) ~4).

PT 14 Data

PT No.	-	JP Table No.	JPT 0	JPT 1	JPT 2
14	-	15	115	116	225PR



### 3.3.13 JPT (Jump Position Table) Start Input

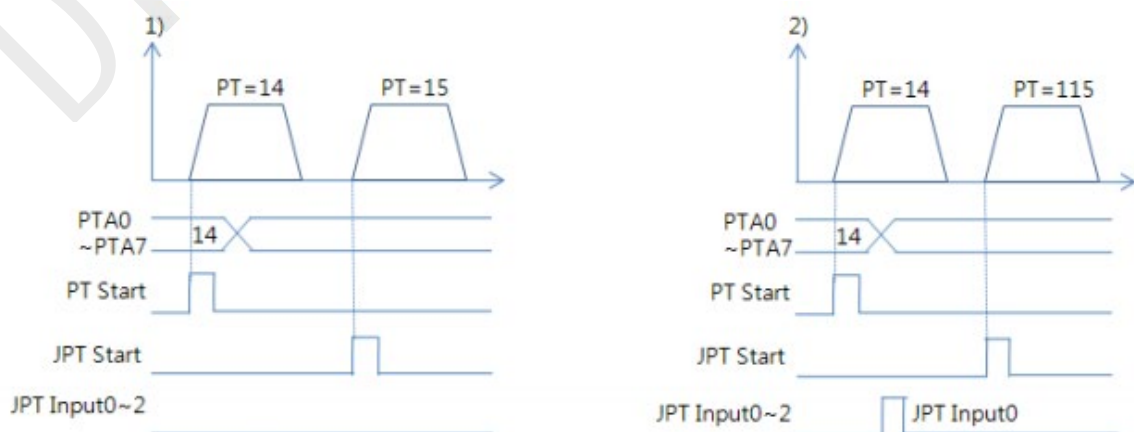
To select motion pattern (position table number) to be subsequently executed according to input signal conditions. The difference from Paragraph [12] 'JPT Input0~Input2 Input] is:

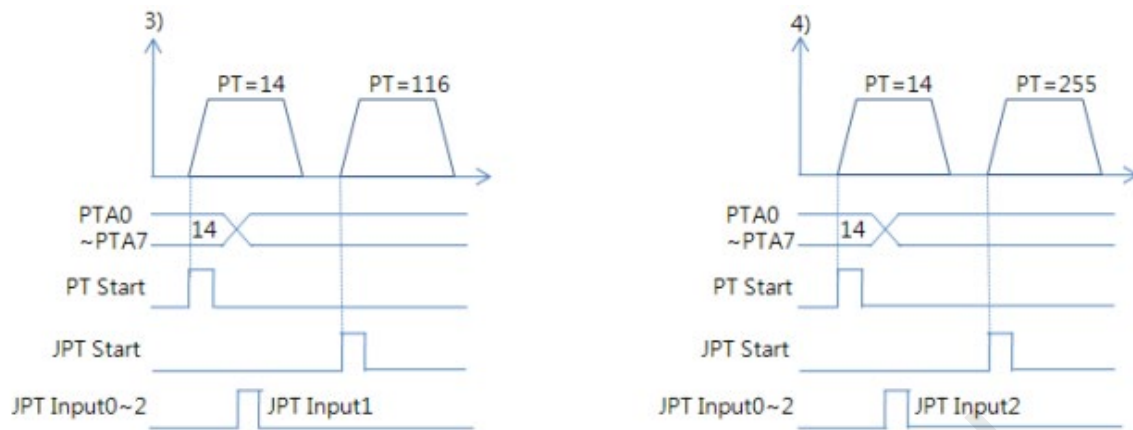
- (1) PT number to be jumped must be composed to 10XXX;
- (2) Next motion is not executed until 'JPT Start' is set to ON. If 'Wait Time' value of PT data is more than '0', the time lapses additionally and then next motion is executed.

#### Ex Example

PT 14 Data

PT No.	-	JP Table No.	JPT 0	JPT 1	JPT 2
14	-	15	115	116	225PR





## 4. Operation

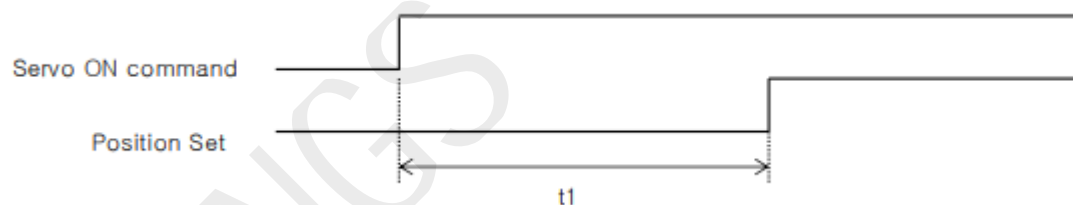
### 4.1 Servo ON Operation

The default setting after power-on is Servo OFF.

The methods of "Servo ON" are as follows.

- (1) Click 'Servo ON' button at the User Program (GUI).
- (2) Send a command to drive through DLL library.
- (3) Assigned the "Servo ON" among the control input terminals and a signal is supplied to the pin.

After Servo ON command is sent, In-position is activated as shown below.



T1 is subject to the supplying power, motor type and parameters of drive.

### 4.2 Operation Mode

This controller can be controlled in two ways such as I/O command, communication command (DLL program or User Program (GUI))

#### (1) I/O Command Mode

This controller can execute control operation by I/O command transmitted from the upper controller

#### (2) Communication Command Mode

This controller can execute control operation by command transmitted from the upper controller.



### 4.2.1 Position Table Operation Sequence

In case of DS-CL28/42-SA, the system can execute sequential operation by position table at the I/O command mode.

- (1) By using PT A0 ~ PT A7 input signal or DLL program, set PT number to be operated.
- (2) In case of Servo OFF, set the controller to Servo ON by communication program or Servo ON control input.
- (3) Start to operate by rising edge of PT Start input signal or communication program.

### 4.2.2 Stopping Continuous Operation of Position Table

When the motor is executing continuous operation of position table with DS-CL28/42-SA, stop executing position table by following methods.

- (1) To use DLL program or control input signal corresponding to 'Stop' and 'E-Stop'. In this case, operation is completely finished and is not connected to next operation.

### 4.2.3 Position Control Operation

You can configure the operation by setting the following parameters with the user GUI program or DLL program.

Parameter Name	Setting contents	Range
Axis Max Speed	Maximum allowable speed	1~800,000[pps] *1 1~500,000[pps] *2
Axis Start Speed	Start speed when acceleration starts	1~35,000[pps]
Axis Acc Time	Required time until the motor reaches the target speed from stop status	1~9,999[ms]
Axis Dec Time	Required time until the motor reaches from the constant speed to the stop status	1~9,999[ms]
Motion Dir	To select motion direction (CW or CCW)	0~1
Pulse per Revolution	Number of pulses per revolution. The range of 'Axis Max Speed' parameter is depend on this value.	0~9

\*1 DS-CL28-SA

\*2 DS-CL42-SA

## 5. Other Operation Function

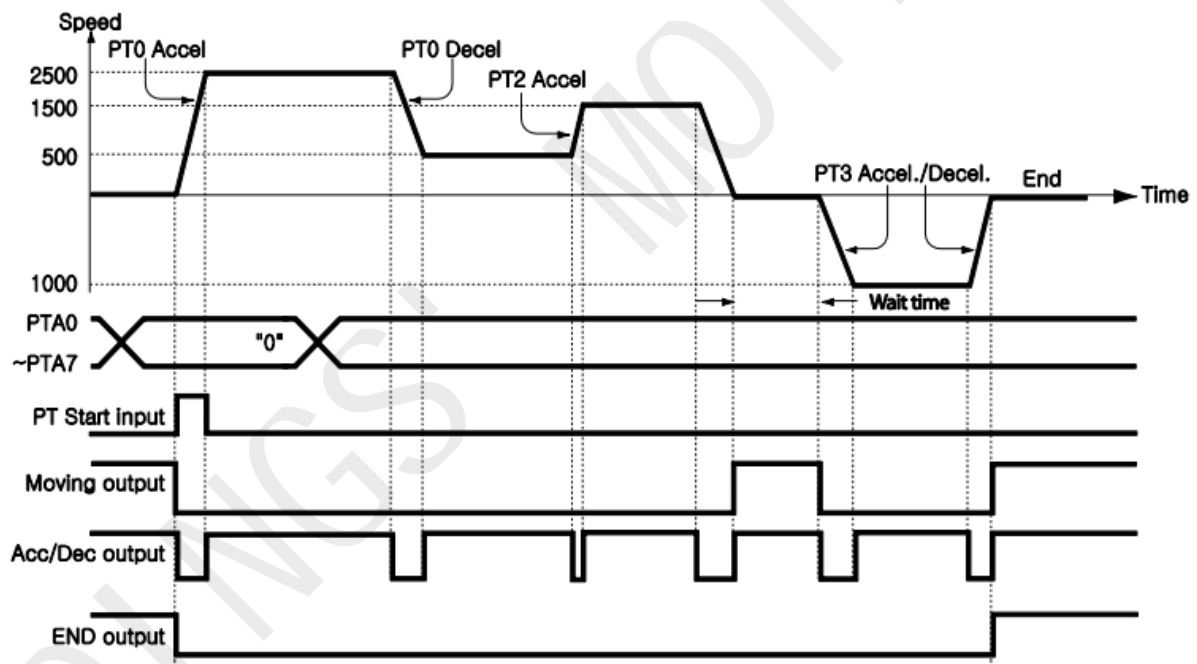


### 5.1 Position Table (PT) Operation Example

Input 'PT A0~ PT A7' signals to set PT number. Input 'PT Start' number to execute speed control operation. For more information, refer to [Technical Manual – Position Table Function].

#### [Position Table Setting]

PT 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	-

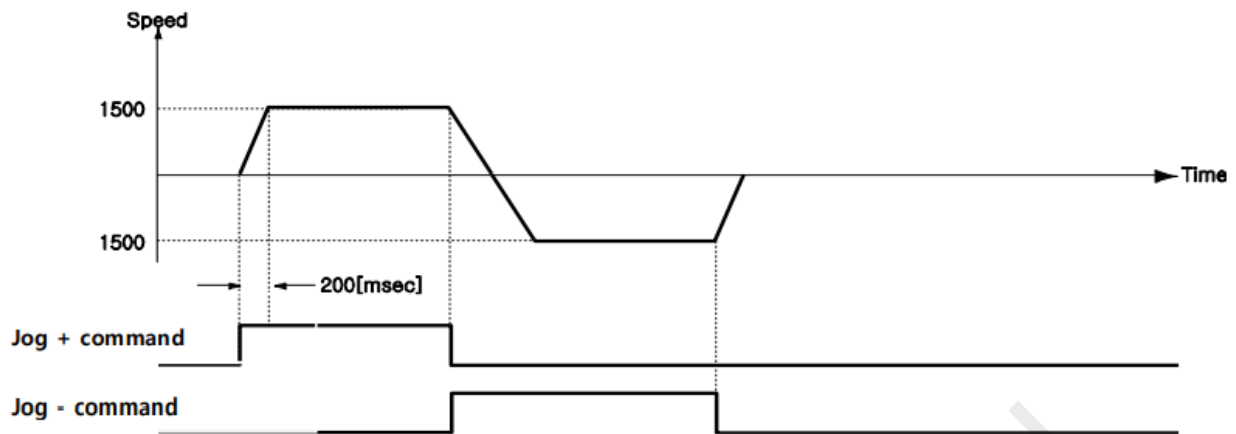


### 5.2 Jog Operation Example

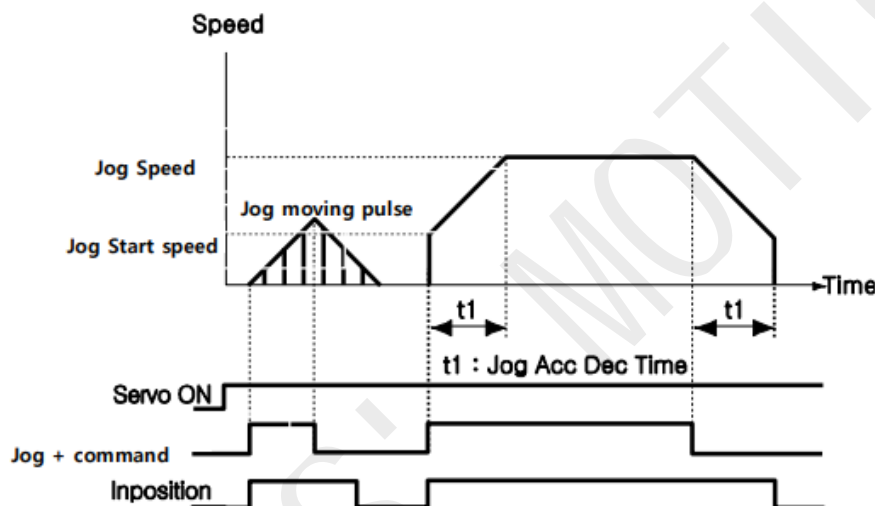
This product executes speed control operation at the speed set by parameters according to inputting 'Jog+' and 'Jog-' signals.

#### [Parameter Setting]

No.	Parameter Name	Setting Value	Unit
6	Jog Speed	1500	[pps]
7	Jog Start Speed	100	[pps]
8	Jog Acc Dec Time	200	[msec]



Also, when any value except 0 is set to the 'Jog Start Speed' parameter, the relation between jog command and in-position is indicating as below diagram.



## 5.3 Origin Return

If the machine is operated by I/O signals, the motor can execute origin return by inputting [Origin Search] signal. Also, the motor can execute origin return with User Program(GUI) and DLL program. The following table shows parameters related to origin return.

Parameter Name	Description	Range
Org Speed	Operation speed when origin return starts	1~800,000 [pps]*1 1~500,000 [pps]*2
Org Search Speed	Low-speed operation speed after origin sensor is sensed and operation start speed when origin starts.	1~50,000 [pps]
Org Acc Dec Time	The time assigned to the acceleration/deceleration section when origin return starts and stops.	1~9,999 [ms]
Org Method	To select how to return the origin	0~7
Org Dir	To select operation direction (CW or CCW)	0~1
Org Offset	After origin return is finished, the motor moves additionally as this setting value and then stops.	-2,147,483,648 ~ +2,147,483,647

Org Position Set	After origin return is finished, 'Command Pos' value is set to this setting value.	-2,147,483,648 ~ +2,147,483,647
Org Sensor Logic	To set the origin sensor signal level.	0~1
Org Torque Ratio	To set the torque ratio during Torque origin method	60~100 [%]

\*1 DS-CL28-SA

\*2 DS-CL42-SA

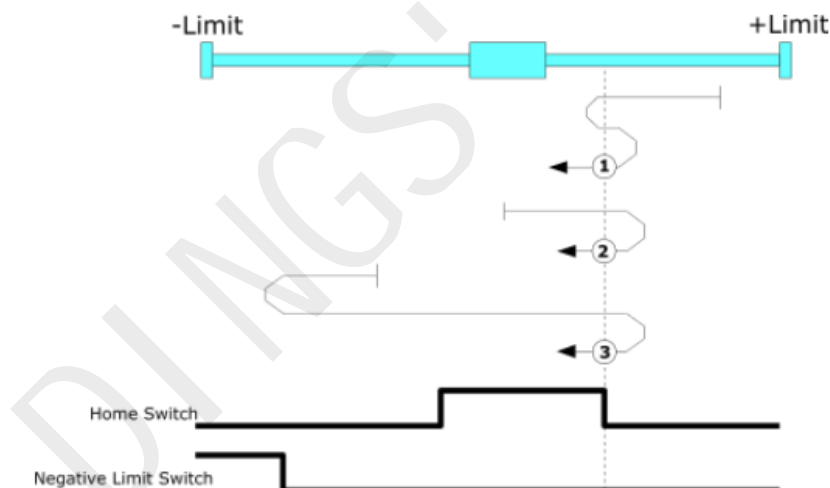
- The Org Torque Ratio value is determined by the load condition and is influenced by motor product variation, power fluctuation, and wiring conditions. Also, if the load fluctuation is expected, please set a sufficiently large value.

### 5.3.1 Origin Return Method Setting

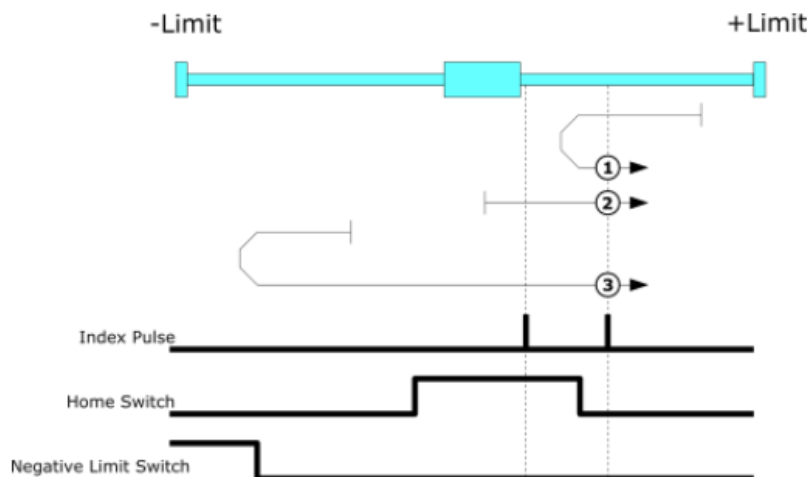
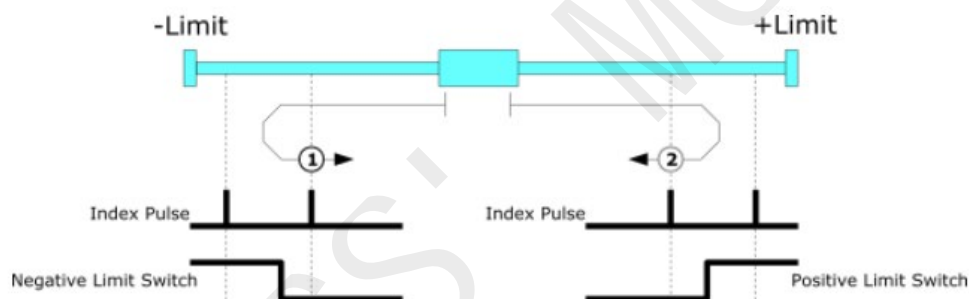
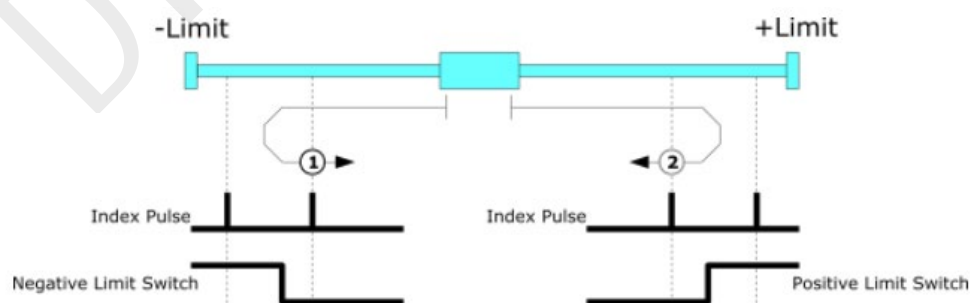
To execute origin return, 'Org Method' parameter should be set as follows.

- The arrows in the picture below depict moving directions.
- In the picture below are origin end positions.  $\lambda$  Index Pulse is Z Phase pulse.
- In case of origin return by a Z-pulse, Slow origin return is performed as the speed of 'Org Search Speed' value.

#### (1) Origin ( In case of Org Method = 0 )

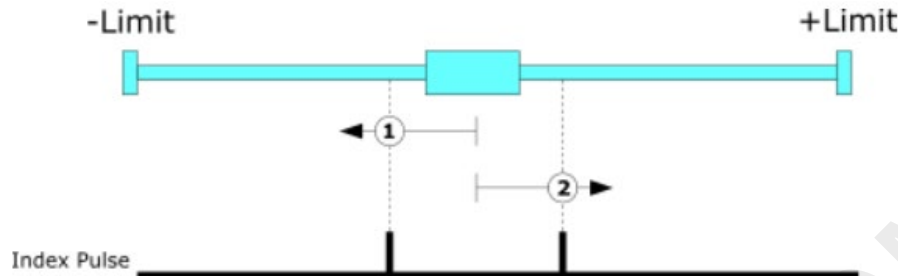


- ① : In case of position of sensor Dog is between the origin and +Limit Sensor
- ② : In case of position of sensor Dog is in the origin sensor
- ③ : In case of position of sensor Dog is between origin and -Limit Sensor

**(2) Origin ( In case of Org Method = 1 )**

**(3) Limit Origin ( In case of Org Method = 2 )**

**(4) Z Limit Origin ( In case of Org Method = 3 )**


**(5) Set Origin ( In case of Org Method = 4 )**

It designates the current mechanical position as a origin irrespective of sensor.

**(6) Z Phase ( In case of Org Method = 5 )**


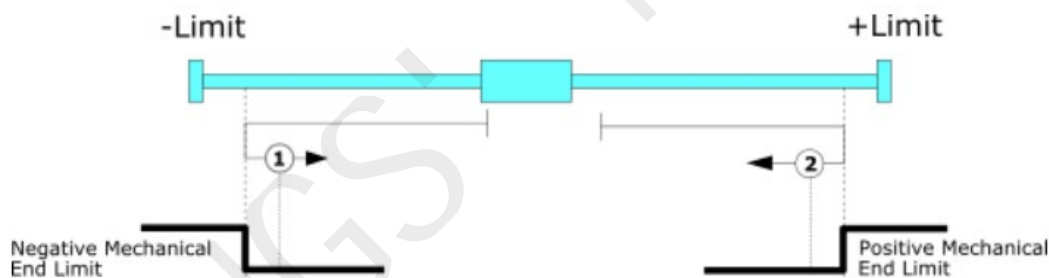
① : In case of Org Dir is 1 (CCW)

② : In case of Org Dir is 0 (CW)

**(7) Torque Origin ( In case of Org Method = 6 )**

During the motion by 'Org Speed' value, It will stop motion when detects the force as much as 'Org Torque Ratio' by contacting with a particular object, and finish the origin movement after moving a specified distance with opposite direction.

This method can be used in the system without origin sensor or limit sensor.



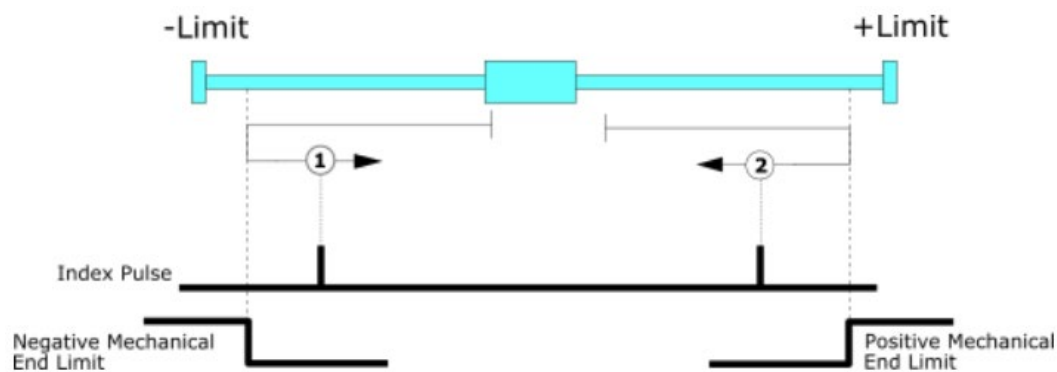
① : In case of Org Dir is 1 (CCW)

② : In case of Org Dir is 0 (CW)

**(8) Torque Origin ( In case of Org Method = 7 )**

During the motion by 'Org Speed' value , It will stop motion when detects a force as much as 'Org Torque Ratio' by contacting with a particular object, And move to opposite direction until detecting the Z phase.

This method can be used in system without origin sensor or limit sensor.



- ① : In case of Org Dir is 1 (CCW)
- ② : In case of Org Dir is 0 (CW)

### 5.3.2 Origin Return Procedure

Origin return is executed according to the following procedure.

- ① Set parameters required to origin return.
- ② If the Servo is OFF, (reset an alarm when it occurs) input a control input Servo ON command or send a communication program so that the Servo can be ON.
- ③ Start origin return operation to the rising edge of control input origin search or the communication program.

### 5.3.3 Interruption of Origin Return

When the machine is under origin return, click 'Stop' or 'E-Stop' to stop the machine. In this case, the machine's origin is not edited and origin return is not completed either.

### 5.3.4 Output of Origin Return Completion

Completion of Origin return can be judged by the value of Origin Search OK (corresponding to Ver06.01.30.05 or later) or the corresponding bit (Origin Search OK) of Axis status of communication program.

## 5.4 Stop Operation

By using of control input or communication program command, the user can do stop and emergency stop. Even though the emergency stop command is inputted, the Servo will be not OFF. In case emergency stop, the machine stops immediately without deceleration. So, a special caution for mechanical impact is required.

## 6. Communication Function



Up to 16 axes can be controlled by Daisy chain of RS-485 communication method.

**Warning**

If Windows goes to the stand-by mode, serial communication is basically disconnected. So, after recovering from the stand-by mode, the user should connect communication again. This content is equally applied to the library provided with the product.

### 6.1 Connection with the PC

There are one method of connecting between the drive and the PC by RS-485 (serial communication). PC's RS-232C port can be used. By using following communication converters according to each communication type, the user can connect the PC and the drive module



#### (1) Cable of Connecting RS232 Port (to PC) and Converter (RS232 ↔ RS-485)

Normally Power does not need to be supplied to the converter module. But when the communication have problems without power, DC 5~24V external power can be connected. The signal is wired as follows

PC Connector (DB-9 female)		Cable Connection	Converten Connector (DB-9 male)	
Pin Layot	Pin No		Pin No	Pin Layot
	1 2 3 4 5 6 7 9 Frame GND		1 2 3 4 5 6 7 9 Frame GND	



(2) **Cable of connecting RS-485 Converter and Drive Module:**

Connector Type : RJ45




Cable Type : LAN cable, CAT5 or better (UTP or STP)

Signal Wiring : Standard Straight Wiring

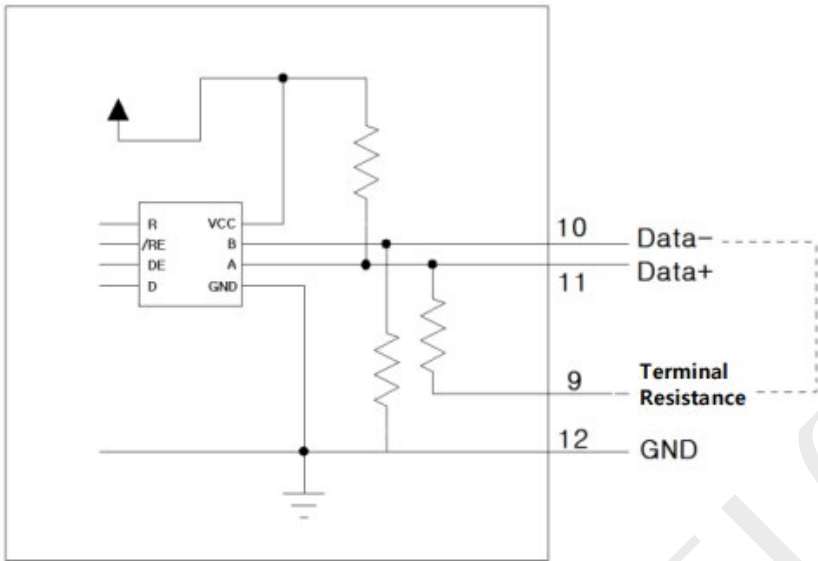
( 1<->1, 2<->2, 3<->3,..., 8<->8 )

If multi-axis connection is required at one segment, up to 16 drive modules can be connected by the daisy-chain method. The pin signal content is as follows.

RJ45 Pin No.	UTP CAT5 cable	Function
1	White/Orange	GND
2	Orange	GND
3	White/Green	Data+
4	Blue	GND
5	White/Blue	GND
6	Green	Data-
7	White/Brown	GND
8	Brown	GND
case		Frame GND

	<b>Warning</b>	The chassis of connector is connected with the Frame GND through a mount hall of the PCB. In this case, use the STP CAT5E cable
	<b>Warning</b>	The cable length of RS-485 Converter<->Drive or Drive<->Drive must be longer than 60 cm.
	<b>Warning</b>	Signal cable 'Data+' and 'Data-' are differential type signals. These two signal cables must be twisted.

6.2 Communication Interface Circuit



It shows the input / output circuit of RS-485 communication interface signal. When the product is installed at the end of the network configuration, connect the terminating resistor to the data pin as shown in the figure. DS-CL42-SA keeps receiving mode usually and transmits only while responding to the receiving command.

For more information of communication function, refer to [ Technical Manual – Communication Function] in a separate volume.

## 7. Parameter



### 7.1 Parameter List

No.	Name	Unit	Lower Limit	Upper Limit	Default
0	Pulse Per Revolution		0	9*1 8*2	9*1 8*2
1	Axis Max Speed	[pps]	1	800,000*1 500,000*2	800,000*1 500,000*2
2	Axis Start Speed	[pps]	1	35,000	1
3	Axis Acc Time	[msec]	1	9,999	100
4	Axis Dec Time	[msec]	1	9,999	100
5	Speed Override (Do not use)	[%]	100	100	100
6	Jog Speed	[pps]	1	800,000*1 500,000*2	5,000
7	Jog Start Speed	[pps]	1	35,000	1
8	Jog Acc Dec Time	[msec]	1	9,999	100
9	S/W Limit Plus Value	[pulse]	-2,147,483,648	2,147,483,647	2,147,483,647
10	S/W Limit Minus Value	[pulse]	-2,147,483,648	2,147,483,647	-2,147,483,648
11	S/W Limit Stop Method		0	2	2
12	H/W Limit Stop Method		0	1	0
13	Limit Sensor Logic <sup>1)</sup> / Reserved		0	1	0
14	Org Speed	[pps]	1	500,000	5,000
15	Org Search Speed	[pps]	1	50,000	1,000
16	Org Acc Dec Time	[msec]	1	9,999	50
17	Org Method		0	7	0
18	Org Dir		0	1	1
19	Org OffSet	[pulse]	-2,147,483,648	2,147,483,647	0
20	Org Position Set	[pulse]	-2,147,483,648	2,147,483,647	0
21	Org Sensor Logic <sup>1)</sup> / Reserved		0	1	0
22	Position Loop Gain		0	63	4
23	Inpos Value		0	127	0
24	Pos Tracking Limit	[pulse]	1	134,217,727	4,000*1 2,500*2
25	Motion Dir		0	1	0
26	Limit Sensor Dir <sup>1)</sup> / Reserved		0	1	0
27	Org Torque Ratio	[%]	60*1 20*2	100*1 90*2	60*1 20*2
28	Pos. Error Overflow Limit	[pulse]	1	134,217,727	4,000*1 2,500*2

29	Brake Delay Time (Not used)	[msec]	0	0	0
30	Run Current	*10[%]	5	15	10
31	Boost Current	*50[%]	0	7	0
32	Stop Current	*10[%]	2	10	5

Note : 1) V06.01.30.22 and later version(DS-CL28/42-SA) has no effect. It can be set by using IO Settings.

\*1 DS-CL28-SA

\*2 DS-CL42-SA

## 7.2 Parameter Description

No.	Description	Unit	Lower Limit	Upper Limit	Default																																				
0	<p><b>Pulse per Revolution :</b></p> <p>Number of pulses per revolution. If this value is changed, the motor is set to Servo OFF.</p> <table><tr><th>Value</th><th>Pulse/Revolution</th><th>Value</th><th>Pulse / Revolution</th></tr><tr><td>0</td><td>500</td><td>8</td><td>10,000</td></tr><tr><td>1</td><td>1,000</td><td>9</td><td>16,000</td></tr><tr><td>2</td><td>1,600</td><td>10</td><td>NA</td></tr><tr><td>3</td><td>2,000</td><td>11</td><td>NA</td></tr><tr><td>4</td><td>3,600</td><td>12</td><td>NA</td></tr><tr><td>5</td><td>5,000</td><td>13</td><td>NA</td></tr><tr><td>6</td><td>6,400</td><td>14</td><td>NA</td></tr><tr><td>7</td><td>7,200</td><td>15</td><td>NA</td></tr></table>	Value	Pulse/Revolution	Value	Pulse / Revolution	0	500	8	10,000	1	1,000	9	16,000	2	1,600	10	NA	3	2,000	11	NA	4	3,600	12	NA	5	5,000	13	NA	6	6,400	14	NA	7	7,200	15	NA		0	9*1 8*2	9*1 8*2
Value	Pulse/Revolution	Value	Pulse / Revolution																																						
0	500	8	10,000																																						
1	1,000	9	16,000																																						
2	1,600	10	NA																																						
3	2,000	11	NA																																						
4	3,600	12	NA																																						
5	5,000	13	NA																																						
6	6,400	14	NA																																						
7	7,200	15	NA																																						
1	<p><b>Axis Max Speed :</b></p> <p>When position moving commands (absolute move, incremental move) are given, this parameter sets the maximum speed which the motor can operate. So, the motor cannot be operated faster than this value in any case. This value is set in pps (pulse/s).</p> <p>Upper Limit value has limited by Pulse per resolution value</p> <p>* In case of 10000 : 500,000 In case of 16000 : 800,000</p>	pps	1	800,000*1 500,000*2	800,000*1 500,000*2																																				
2	<p><b>Axis Start Speed :</b></p> <p>When position moving commands (absolute move, incremental move) are given, this parameter sets the operation start speed in pps (pulse/s)</p>	pps	1	35,000	1																																				

3	<b>Axis Acc Time :</b>  When position moving commands (absolute move, incremental move) are given, this parameter sets the acceleration time in milliseconds	msec	1	9,999	100
4	<b>Axis Dec Time :</b>  When position moving commands (absolute move, incremental move) are given, this parameters sets the deceleration time in milliseconds.	msec	1	9,999	100
5	<b>Speed Override :</b>  When position moving commands (absolute move, incremental move) are given, the operation speed is subject to the ratio set to 'Move Speed'. (Ex) If current move speed is 10,000 and speed override is 200, actual motion speed is set to 20,000. (Not used in DS-CL28/42-SA)	%	100	100	100
6	<b>Jog Speed :</b>  When jog command is given, this parameter sets the motor speed in pps (pulse/s).	pps	1	800,000*1 500,000*2	5,000
7	<b>Jog Start Speed :</b>  When jog position moving command is given, this parameter sets the operation start speed in pps (pulse/s).	pps	1	35,000	1
8	<b>Jog Acc Dec Time :</b>  In case of jog operation, this parameter sets the time of acceleration and deceleration in milliseconds.	msec	1	9,999	100
9	<b>S/W Limit Plus Value :</b>  When position moving commands (absolute move, incremental move, jog) are given, this parameter sets the maximum position limit that the motor can move to the plus (+) direction with 32 bits.	pulse	-2,147,483,648	+2,147,483,647	+2,147,483,647
10	<b>S/W Limit Minus Value :</b>  When position moving commands (absolute move, incremental move, jog) are given, this parameter set the minimum position limit that the motor can move to the minus (-) direction with 32 bits.	pulse	-2,147,483,648	+2,147,483,647	-2,147,483,648
11	<b>S/W Limit Stop Method :</b>  Sets how to stop the motor by SW Limit Plus / Minus Value', not stop motion by the limit sensor.  ♦ 0 : stops the motor immediately by emergency stop mode. ♦ 1 : stops the motor gradually by soft stop mode. ♦ 2 : Do not use S/W Limit.		0	2	0

12	<b>H/W Limit Stop Method:</b> In case of stop motion by the limit sensor, this mode sets how to stop the motor. ♦ 0 : stops the motor immediately by emergency stop mode. ♦ 1 : stops the motor gradually by soft stop mode.		0	1	0
13	<b>Limit Sensor Logic :</b> Sets the active level of Limit signal. ♦ 0 : 0 V (Active low level) ♦ 1 : 24V (Active high level) <b>* This parameter is not used in V06.01.30.22 and later version (DS-CL28/42-SA)</b>		0	1	0
14	<b>Org Speed :</b> In case of origin return command, this parameter sets the operation speed until the motor senses the origin sensor in pps (pulse/s).	pps	1	500,000	5,000
15	<b>Org Search Speed :</b> In case of origin return command, The low operation speed for precise origin return after the motor senses the origin sensor is set in pps (pulse/s) by this parameter.	pps	1	500,000	1,000
16	<b>Org Acc Dec Time :</b> In case of origin return command, the acceleration / deceleration section time of the operation start / stop segment is set in milliseconds by this mode	msec	1	9,999	50
17	<b>Org Method :</b> The user can select origin return command types. ♦ 0 : The motor moves up to the origin sensor spot by 'Org Speed' and then executes precise origin return at the low value of 'Org Search Speed'. ♦ 1 : The motor moves up to the origin sensor spot by 'Org Speed' and then executes Z-pulse origin return at the low value of 'Org Search Speed'. ♦ 2 : The motor moves up to the limit sensor spot by 'Org Speed' and then immediately stops. ♦ 3 : The motor moves up to the limit sensor spot by 'Org Speed' and then executes Z-pulse origin return at the low value of 'Org Search Speed'. ♦ 4 : To set origin in current mechanical position. ♦ 5 : To execute the Z-pulse origin return at the low value of 'Org Search Speed'. ♦ 6 : The motor moves up to the wall by 'Org Torque Ratio' and then immediately stops. ♦ 7 : The motor moves up to the wall by 'Org Torque Ratio' and then executes Z-pulse origin return at the low value of 'Org Search Speed'. For more information, refer to '9.3 Origin Return'.		0	7	0

18	<b>Org Dir :</b>  In case of origin return, this parameter sets the direction of the motor.  ♦ 0 : moves the motor clockwise. ♦ 1 : moves the motor counterclockwise.		0	1	0
19	<b>Org Offset :</b>  After origin return is completed, the motor moves additionally as this setting value and then stops. 'Command Pos / Actual Pos' is set to '0'.	pulse	-2,147,483,648	+2,147,483,647	0
20	<b>Org Position Set :</b>  After origin return is completed, 'Command Pos / Actual Pos' value is set to this setting value.	pulse	-2,147,483,648	+2,147,483,647	0
21	<b>Org Sensor Logic :</b>  Sets the origin sensor signal level so that the motor can recognize origin sensor's input to ON.  ♦ 0 : 0 V (low level) ♦ 1 : 24V(high level) <b>* This parameter is not used in V06.01.30.22 and later version (DS-CL28/42-SA)</b>		0	1	0
22	<b>Position Loop Gain :</b>  After the motor stops, this mode controls the motor's response by a load attached to the motor. This is a relative value, not a real value In use of internal drive. For example, if this value is changed 3 to 6, not increased the response time two times.  If this parameter value is small, motor stop motion become sensitive, motor stop time is getting shorter, and , if value is big stop motion becomes insensitive , motor stop time is getting longer relatively. Set this mode as follows. 1) Set the value to '0' 2) Increase the value until the motor's response is stabilized. 3) Previously adjust the setting status by increasing / decreasing one or two steps of the current setting value.		0	63	4

Value	Integral Part's Time Constant*	Proportional Gain*	Value	Integral Part's Time Constant*	Proportional Gain*
0	1	1	32	5	1
1	1	2	33	5	2
2	1	3	34	5	3
3	1	4	35	5	4
4	1	5	36	5	5

5	1	6	37	5	6
6	1	7	38	5	7
7	1	2	39	5	2
8	2	1	40	6	1
9	2	2	41	6	2
10	2	3	42	6	3
11	2	4	43	6	4
12	2	5	44	6	5
13	2	6	45	6	6
14	2	7	46	6	7
15	2	8	47	6	8
16	3	1	48	7	1
17	3	2	49	7	2
18	3	3	50	7	3
19	3	4	51	7	4
20	3	5	52	7	5
21	3	6	53	7	6
22	3	7	54	7	7
23	3	2	55	7	2
24	4	1	56	8	1
25	4	2	57	8	2
26	4	3	58	8	3
27	4	4	59	8	4
28	4	5	60	8	5
29	4	6	61	8	6
30	4	7	62	8	7
31	4	8	63	8	8

Inpos Value :

Sets the output condition of the in-position signal. After position command pulse is finished, when the position deviation from target position is within 'Inpos Value', this mode displays in- position finish signal

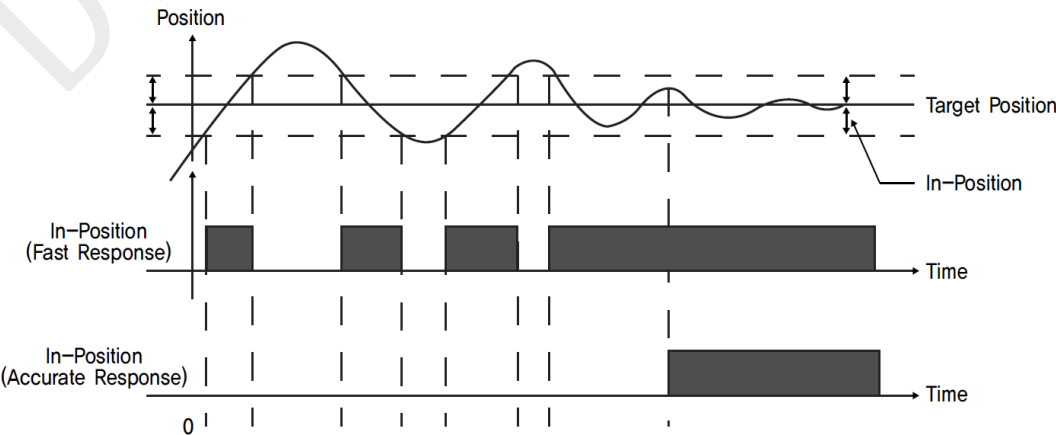
The position deviation to output the In-position is 0~63.. According to control mode set value is as follows:

- 1) Fast Response Mode : 0~63
- 2) Accurate Response Mode : 64~127

According to each mode, the position deviation range is 0~63.

01270

23 Fast Response and Accurate Response control method is as below fig.





24	<b>Pos Tracking Limit :</b>  While the motor is run, when 'Position Error' is greater than this setting value, this mode generates an alarm to stop a flow of electricity to the motor and then set it to Servo OFF.	pulse	1	+134,217,727	4,000*1 2,500*2
25	<b>Motion Dir :</b>  When the motor operates by position command, this mode sets the revolution direction of the motor.  ◆ 0 : moves the motor clockwise. ◆ 1 : moves the motor counterclockwise.		0	1	0
26	<b>Limit Sensor Dir :</b>  Sets the limit sensor direction to stop the motor to the limit spot under operation.  ◆ 0 : When operation direction is 'CW', input the sensor signal to the Limit+ direction, and the motor will stop. ◆ 1 : When operation direction is 'CW', input the sensor signal to the Limit- direction, and the motor will stop.  <b>* This parameter is not used in V06.01.30.22 and later version (DS-CL28/42-SA)</b>		0	1	0
27	<b>Org Torque Ratio :</b>  In case of 'Origin Method' parameter is set to '5' or '6' to set the maximum torque value to stop the motor.	%	60*1 20*2	100*1 90*2	60*1 20*2
28	<b>Pos. Error Overflow Limit :</b>  Acts to protect the motor and the drive. While the motor stops and is set to Servo ON, when 'Position Error' is greater than this setting value, this mode generates an alarm to stop a flow of electricity to the motor and then set it to Servo OFF.	pulse	1	+134,217,727	4,000*1 2,500*2
29	<b>Brake Delay Time :</b>  According to the SERVO ON command, It can be set the brake operation time. <b>* This parameter is not used in V06.01.30.22 and later version (DS-CL28/42-SA)</b>	msec	10	5,000	200
30	<b>Run Current:</b>  Run Current is value of running current during the operating of motor, it is set based on rated current of motor. This value is related with torque in operating of motor, if this value is big, motor torque getting high in operation. So, in case of lack of torque, it can be raising the torque by increasing the run current value.	*10[%]	5	15	10

	<p>Precaution)</p> <p>To be notified If Run Current value is high, heat perature can be increasing.</p> <p>Run Current is automatically controlled according to d, so please use in case of lacking torque in operation.</p>				
31	<p><b>Boost Current :</b></p> <p>It is the parameter of supplied current to motor to improve for character of acceleration in case of cannot set the acceleration time sufficiently. .</p> <p>(it is applied to acceleration .) Example of use )</p> <p>1) 28L (Current: 0.9[A])</p> <p>2) Run Current : 10(100[%])</p> <p>3) Boost Current : 1(50[%])</p> <p>4) Control current in case of acceleration : 0.9[A]+0.9[A]*50[%] = 1.35[A]</p> <p>Precaution)</p> <p>1) To be notified If Run Current value is high, heat temperature can be increasing.</p>	*50[%]	0	7	0
32	<p><b>Stop Current:</b></p> <p>Stop Current is meaning of motor current which is automatically set after 0.1 second since motor stop. This parameter is using to decrease the temperature when motor stopped long- time. It also can be increased the motor temperature in case set-up more than 60%.</p>	*10[%]	10	10	5



## 8. Protection Function

### 8.1 Type of Alarm

When an alarm occurs while the controller is operating, a red LED flashes and the following protective function will be displayed according to the number of LED flash counting.

Times	Alarm name	Condition
1	Over Current Error	The current through power devices in drive exceeds 4.8A
2	Over Speed Error	Motor speed exceeds 3,000 [rpm]
3	Position Tracking Error	Position error value is higher than 90° in motor run state *1
4	Over Load Error	The motor is continuously operated more than 5 seconds under a load exceeding the max. torque
5	Over Temperature Error	Inside temperature of drive exceeds 85°C
6	Over Regenerated Voltage Error	Back-EMF is higher than 48V
7	Motor Connect Error	The power is ON without connection of the motor cable to drive
8	Encoder Connect Error	Cable connection error in Encoder connection of drive
10	In-Position Error	After operation is finished, a position error occurs
12	ROM Error	Error occurs in parameter storage device(ROM)
15	Position Overflow Error	Position error value is higher than 90° in motor stop state *2

\*1 The setting value [pulse] in 'Pos Tracking Limit[No.24]'parameter

\*2 The setting value[pulse] in 'Pos Error Overflow Limit[No28]' parameter

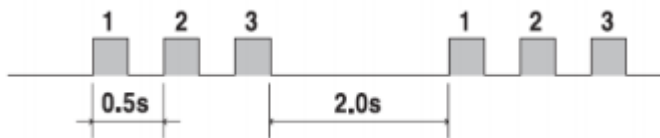
### 8.2 Acquiring the Alarm Information

When an alarm occurs, the motor become Servo OFF and then stops by free run and at the same time displays alarm message. It is display the alarm number on 7-Segment for alarm ID display purpose. Also, 'AlarmBlink' signal repeats On/Off according to the timing as illustrated below. The red LED flash every 0.5 second in accordance with alarm number and wait for 2 seconds. And then red LED flash repeatedly until inputting 'AlarmReset' signal.

**Ex**

**Example**

Alarm 3 : 'AlarmBlink' display signal occurred when the step-out is occurred



## 8.3 Alarm Check and Release



If an alarm occurs, remove its cause and then release it. The alarm can be released as follows. In case of alarms of which 'Reset' column is indicated to 'Invalid', power must get down prior to releasing the alarms

Flash Count	Alarm Name	Description	Reset
1	Over Current Error	1) Check the motor's short-circuit (A, /A, B, /B) 2) Check the mechanical status, parameter settings.	Valid
2	Over Speed Error	1) Check parameter setting, and abnormal operation of the motor. 2) Check the speed command of upper controller(ex:PLC).	Valid
3	Position Tracking Error	1) Get down the load or increase the acceleration or deceleration speed. 2) Check assemble status of mechanism. 3) Check the brake signal cable. 4) Check the motor's short-circuit (A, /A, B, /B) 5) Check the encoder cable connection status. 6) Check the parameter setting value.	Valid
4	Over Load Error	1) Compare the motor's rating with load scale. 2) Check assemble status of mechanism. 3) Check 'SW limit' value of parameter. 4) Check the status of sensors. 5) Check the motorDB for driver and motor.	Valid
5	Over Temperature Error	1) Get down the ambient temperature or install a cooling fan. 2) Check the distance is over 50mm between drivers.	Valid
6	Over Regenerated Voltage Error	1) In case of high-speed operation, check if the acceleration or deceleration speed is low.	Valid
7	Motor Connect Error	1) Check if power is supplied to the drive. 2) Check the diameter and length of power cable	Invalid
8	Encoder Connect Error	1) Please contact to distributor if it occurs again after power OFF / ON.	Invalid
10	In-Position Error	1) Check if parameters are set correctly or the machine is over-loaded. 2) Check the vibration of mechanism and belt tension. 3) Check the cabling status of motor and encoder.	Valid
12	ROM Error	1) Contact to distributor.	Invalid
15	sition Overflow Error	1) Get down the load or increase the acceleration or deceleration speed. 2) Check the brake and encoder is working correctly or not.	Valid



## 9. Accessories

### 9.1 DS-CL28-SA Accessories

#### ◆ Connectors

These are connector specifications for drive cabling.

Purpose	Item	Part Number	Manufacturer
Power & Signal	Housing	GHR-12V-S	JST
	Terminal	SSHL-002T-P0.2	

※ The connectors above are supplied with the product. If you are using other parts, please make sure they meet the specifications.

#### ◆ Power & Communication & Input / Output Cable

It is the cable to connect DS-CL28-SA drive, power, communication, and other input/output devices.

Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive - Power & Communication & Input / Output Connection	CSVB-A-0R4F	0.4	Normal Cable	Maximum Length: • Signal Cable: 20m • Power Cable: 2m • RS-485 Cable: 30m



#### ◆ Options

##### ① RS-485 Converter

Purpose	Part Number	Specifications	Product Image
RS-232C to RS-485 Converter	FAS-RCR	Baud rate	Max. 115.2kbps
		Comm. Distance	RS-232C: Max. 15m RS-485: Max. 1.2km
		Connector	RS-232C: DB9 Female RS-485: RJ-45
		Dimensions	50X75X23mm
		Weight	38g
		Power	Power supplied by RS-232C (DC5~24V external power can be applied)



② RS-232C Cable

These are the cables to connect FAS-RCR and RS-232C port of the host controller.

Purpose	Part Number	Length [m]	Cable Type
FAS-RCR- RS-232C Connection	CGNR-C-002F	2	Normal Cable
	CGNR-C-003F	3	
	CGNR-C-005F	5	

9.2 DS-CL42-SA Accessories



◆ Connectors

These are connector specifications for drive cabling.

Purpose	Item	Part Number	Manufacturer
Power (CN2)	Terminal Block	MC421-38102	DECA
Signal (CN1)	Housing	501646-1400	MOLEX
	Terminal	501648-1000 (AWG 26~28)	

※ The connectors above are supplied with the product. If you are using other parts, please make sure they meet the specifications.

◆ Options

① Single Cable

These are the cables to connect DS-CL42-SA drive and other input/output devices.

Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive - I/O Device Connection	CSAD-S-001F	1	Normal Cable	Maximum Length : 20m
	CSAD-S-002F	2		
	CSAD-S-003F	3		
	CSAD-S-005F	5	Robot Cable	
	CSAD-S-001M	1		
	CSAD-S-002M	2		
	CSAD-S-003M	3		
	CSAD-S-005M	5		

## ② Drive Power Cable

These are the cables to connect DS-CL42-SA drive and the power.

Purpose	Part Number	Length [m]	Cable Type	Remarks
Drive - Power Connection	CSAD-P-001F	1	Normal Cable	Maximum Length : 2m
	CSAD-P-002F	2		
	CSAD-P-001M	1	Robot Cable	
	CSAD-P-002F	2		

## ③ RS-485 Cable 1

These are the cables to connect DS-CL42-SA drive with RS-485 network.

Purpose	Part Number	Length [m]	Cable Type	Remarks
RS-485 Connection	CGNR-R-0R6F	0.6	Normal Cable	Maximum Length : 30m
	CGNR-R-001F	1		
	CGNR-R-1R5F	1.5		
	CGNR-R-002F	2		
	CGNR-R-003F	3		
	CGNR-R-005F	5		

## ④ RS-485 Cable 2

These are the cables to connect DS-CL42-SA drive and FAS-RCR.

Purpose	Part Number	Length [m]	Cable Type	Remarks
RS-485 Connection	CGNA-R-0R6F	0.6	Normal Cable	Maximum Length : 30m
	CGNA-R-001F	1		
	CGNA-R-1R5F	1.5		
	CGNA-R-002F	2		
	CGNA-R-003F	3		
	CGNA-R-005F	5		

## ⑤ RS-485 Cable 2

Purpose	Part Number	Specifications	Product Image
RS-232C to RS-485 Converter	FAS-RCR	Baud rate	Max. 115.2kbps
		Comm. Distance	RS-232C: Max. 15m RS-485: Max. 1.2km
		Connector	RS-232C: DB9 Female RS-485: RJ-45
		Dimensions	50X75X23mm
		Weight	38g
		Power	Power supplied by RS-232C (DC5~24V external power can be applied)



⑥ RS-485 Cable 2

These are the cables to connect FAS-RCR and RS-232C port of the host controller.

Purpose	Part Number	Length [m]	Cable Type
FAS-RCR-RS-232C Connection	CGNR-C-002F	2	Normal Cable
	CGNR-C-003F	3	
	CGNR-C-005F	5	





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