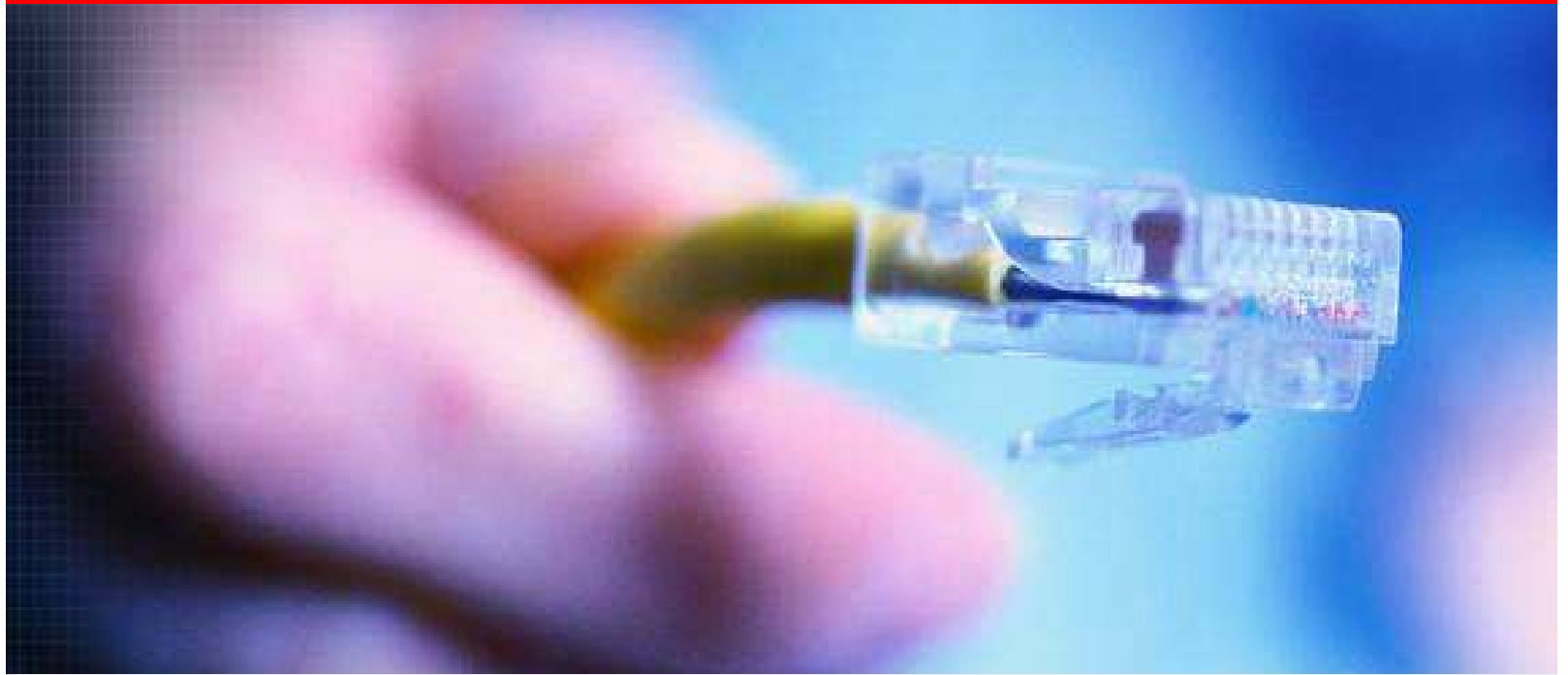
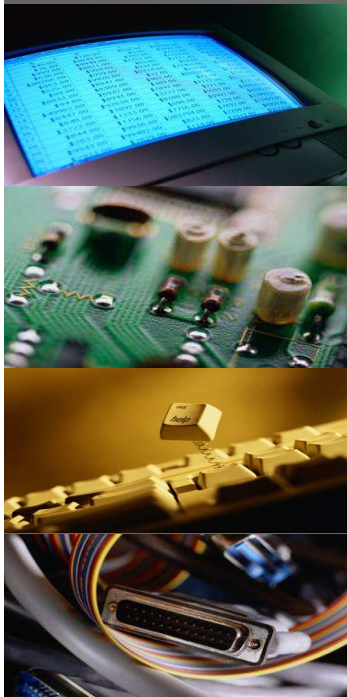


# Guide Book for L7P (Index Parameter)



2015.06

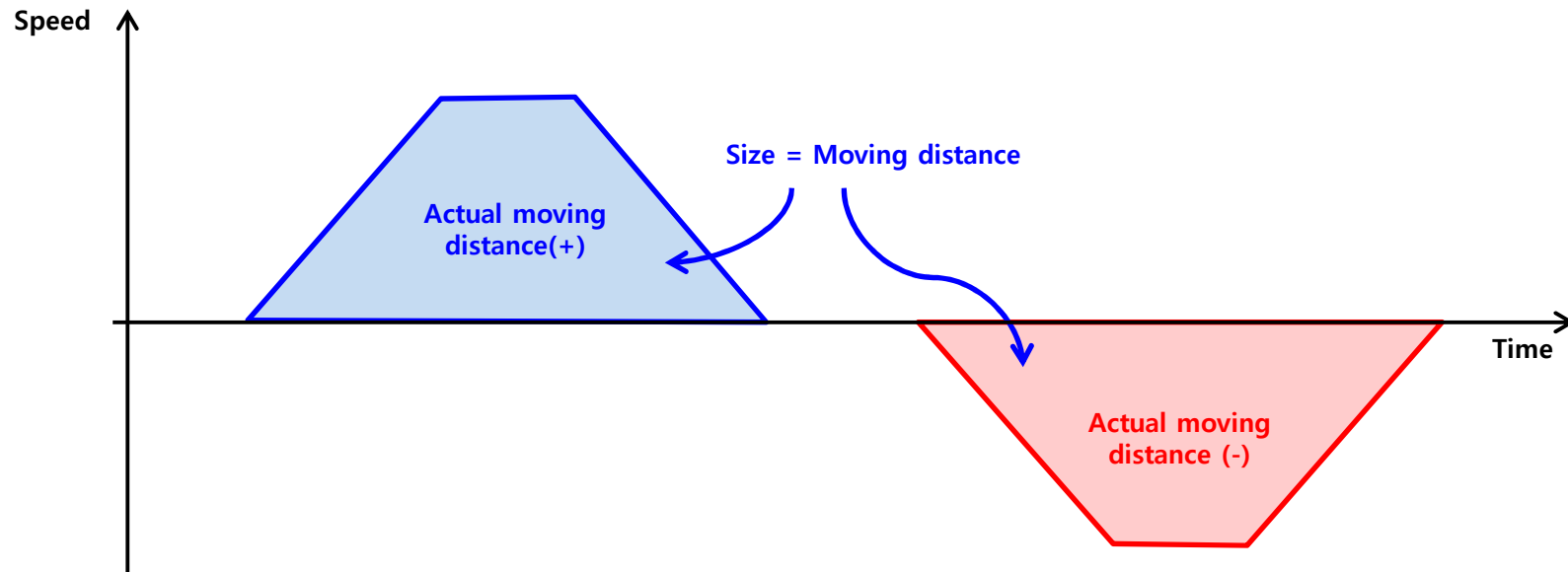
Index 0	
Index Type	Relative
Distance [UU]	100000
Velocity [UU/s]	100000
Acceleration [UU/s <sup>2</sup> ]	1000000
Deceleration [UU/s <sup>2</sup> ]	1000000
Registration Distance [UU]	100000
Registration Velocity [UU/s]	1000000
Repeat Count	1
Dwell Time [ms]	200
Next Index	1
Action	Next Index
<input type="button" value="Copy"/> <input type="button" value="Paste"/>	

Name		Description
Index type	Linear	0: Absolute Move 1: Relative Move 2: Registration Absolute Move 3: Registration Relative Move 4: Blending Relative Move 5: Blending Absolute Move
	Rotary	6: Rotary Absolute Move 7: Rotary Relative Move 8: Rotary Shortest Move 9: Rotary Positive Move 10: Rotary Negative Move
Distance		-2147483648 ~ +2147483647 (Unit:UU)
Velocity		1 ~ 2147483647 (Unit:UU/s)
Acceleration		1 ~ 2147483647 (Unit:UU/s <sup>2</sup> )
Deceleration		1 ~ 2147483647 (Unit:UU/s <sup>2</sup> )
Registration distance		-2147483648 ~ +2147483647 (Unit:UU)
Registration velocity		1 ~ 2147483647 (Unit:UU/s)
Repeat count		1~65535
Dwell time		0~65535 (Unit:ms)
Next index		0~63
Action		0: Stop 1: Wait for Start 2: Next Index

\*UU: User Unit

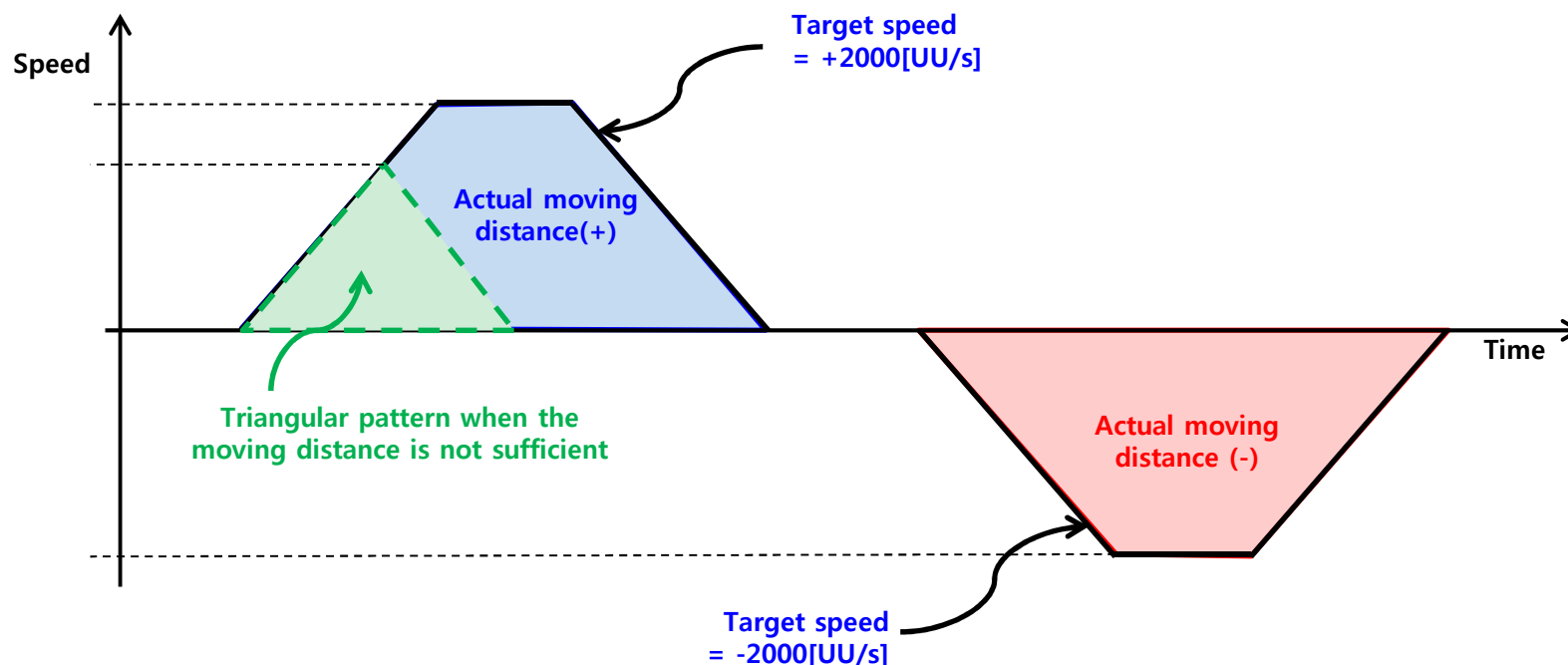
- Distance means moving distance of each index(unit: UU).
- It could be absolute or relative distance.
- Actual moving distance of absolute movement = Distance - Current position
- Actual moving distance of relative movement = Distance
- The actual moving distance is the area of the colored trapezoidal for the acceleration/deceleration patterns below.

Index type	Linear
	Rotary
<b>Distance</b>	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	



- Setting for target speed for index operation(unit: UU/s)
- Velocity need to have positive(+) value regardless of the movement distance.
- The sign of the actual(internal) target speed is determined based on actual movement distance.
- When the moving distance is not sufficient compared with the set value of speed and acceleration/deceleration, a triangular pattern may be generated with peak speed lower than target speed.

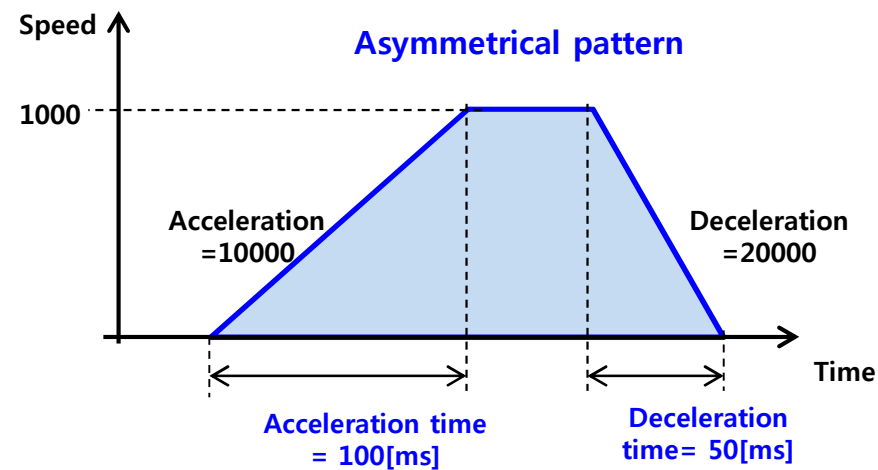
Index type	Linear
	Rotary
Distance	
<b>Velocity</b>	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	



# Acceleration and Deceleration

- L7P supports asymmetrical acceleration/deceleration operation, where the acceleration and deceleration are different from each other.
- Ex) As shown in the figure below, when Speed = 1000[UU/s], Acceleration = 10000[UU/s<sup>2</sup>], Deceleration 20000[UU/s<sup>2</sup>], the acceleration time to the target speed is 100[ms](=1000[UU/s]/10000[UU/s<sup>2</sup>] ), and the deceleration time is 50[ms] = ( 1000[UU/s]/20000[UU/s<sup>2</sup>] ).

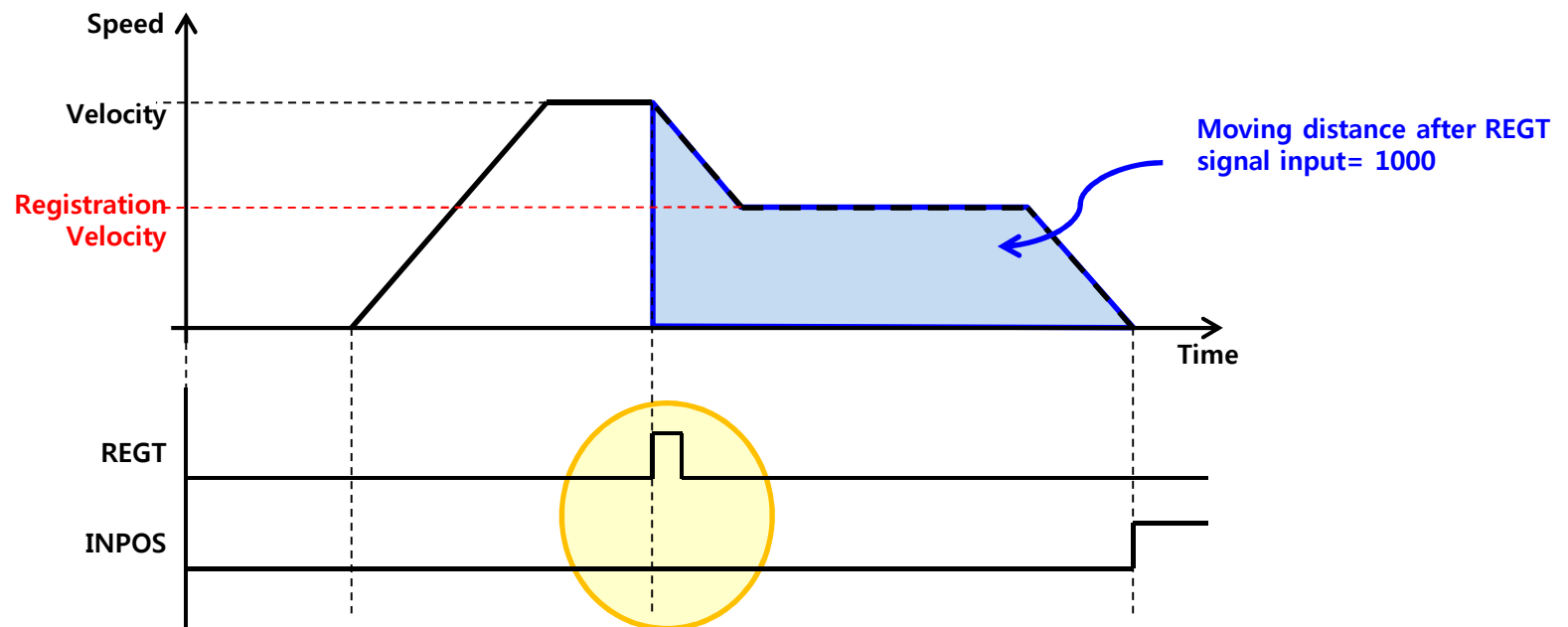
Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	



# Registration Distance and Velocity

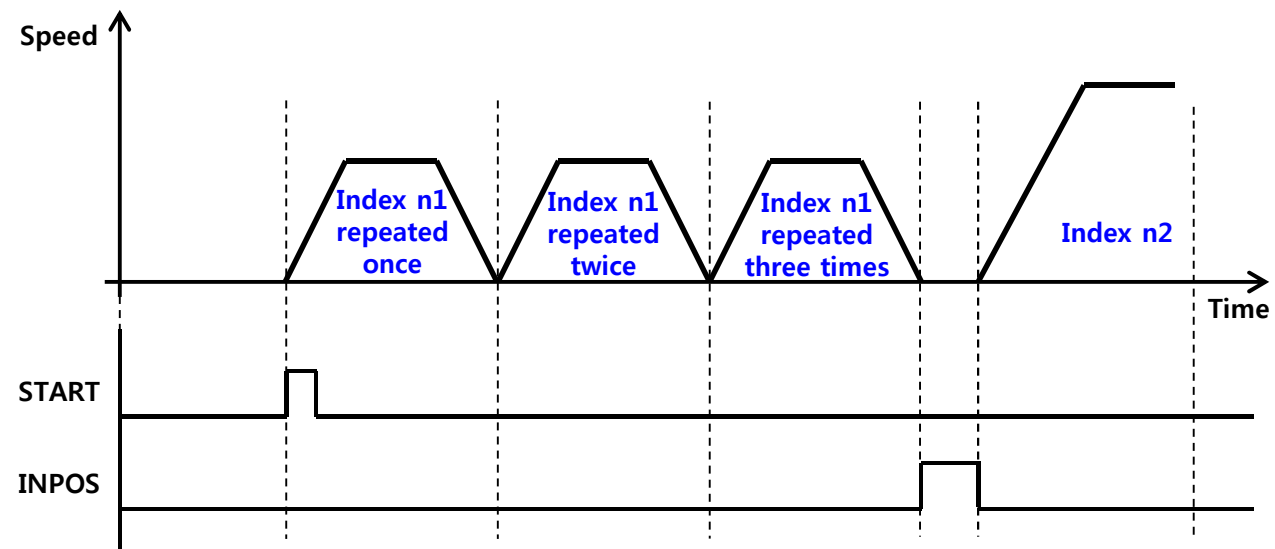
- If index type is Registration Absolute or Registration Relative, the operation speed and distance could be changed by REGT signal input.
- Distance after REGT signal input is determined by the Registration Distance.
- Registration Distance : Means the moving distance (unit: UU) after the REGT signal input.
- Registration Velocity : Means the target velocity (unit: UU/s) for movement after the REGT signal input.
- The acceleration/deceleration for registration movement using same preset value of acceleration/deceleration.

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	



- The index is repeatedly operated as many times as the set value of the repeat count.
- The dwell time does not apply during repeated index operation

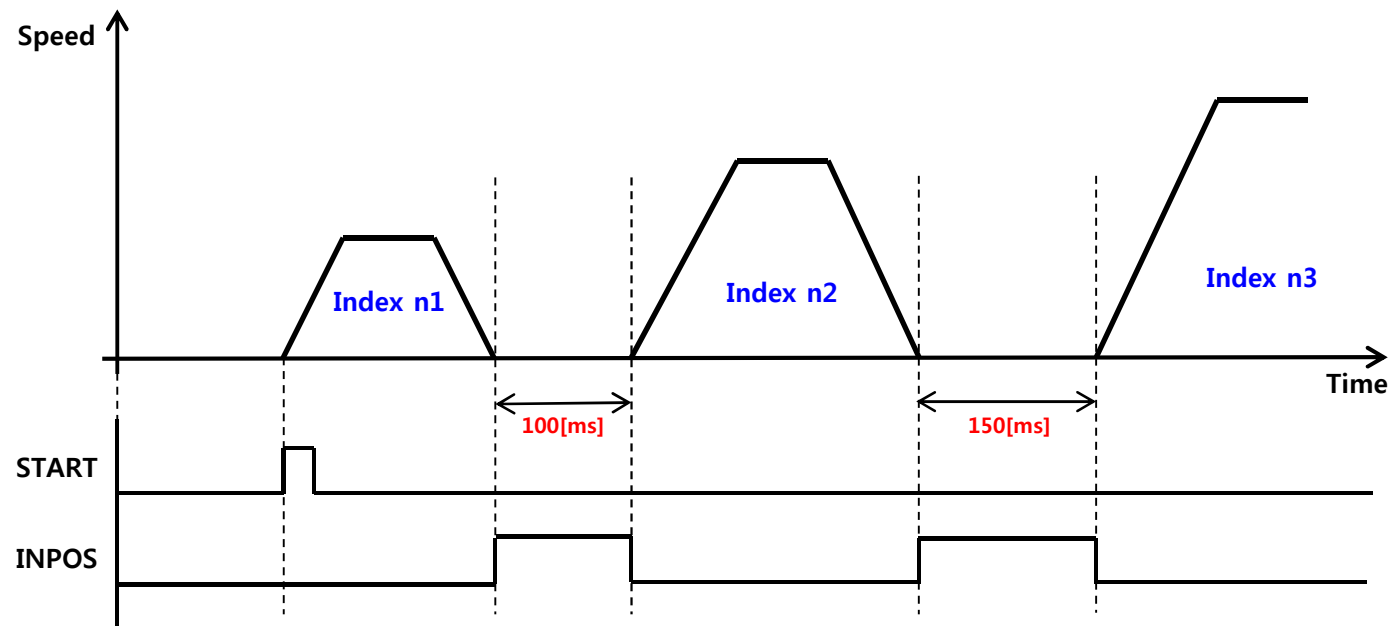
Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
<b>Repeat count</b>	
Dwell time	
Next index	
Action	



Ex) Index n1 : Repeat Count = 3

- Dwell time sets delay time between index operations. (unit: ms)
- The dwell time is applied when the generation of index operation pattern is completed. (refer to a picture below)

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
<b>Dwell time</b>	
Next index	
Action	



Ex) Index n1 : Dwell Time = 100[ms], Index n2 : Dwell Time = 150[ms]

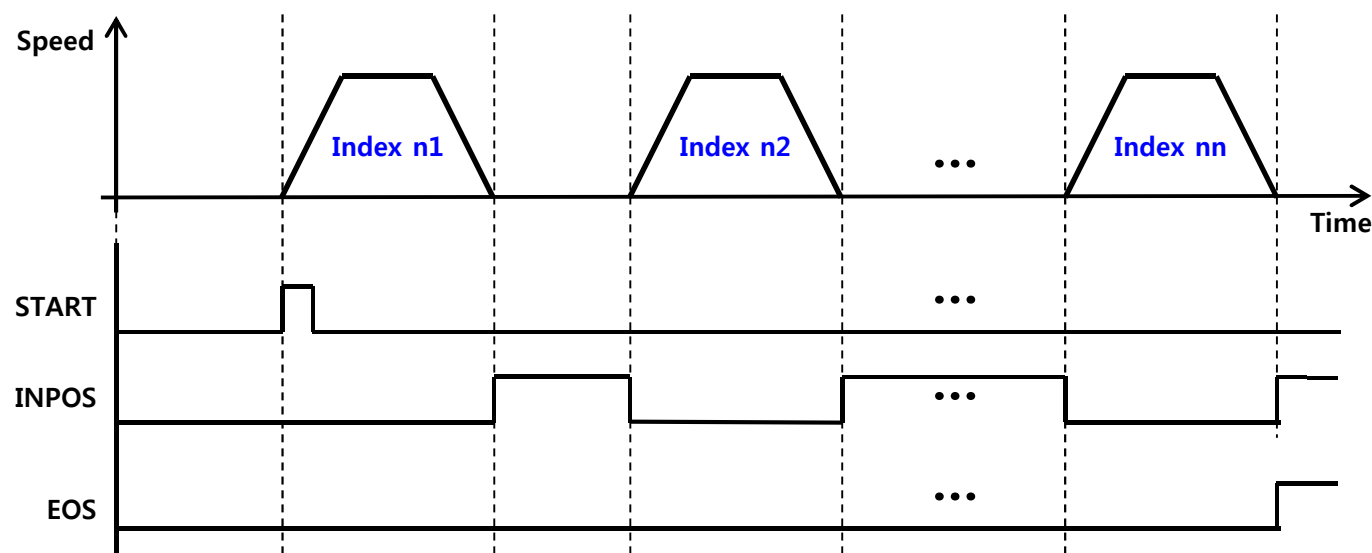


- It sets a number of the index which is automatically executed after current index operation is completed, if the action of the current index is set to Next Index.
- Please see the explanation of 'Next Index' for further details.

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
<b>Next index</b>	
Action	

- If the Action of the index is set as Stop (set value 0), the overall sequence is completed after the relevant index operation is completed (EOS = 1).
- With a START signal input, the index operation begins with a start index (0x3008, 0~63).

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	

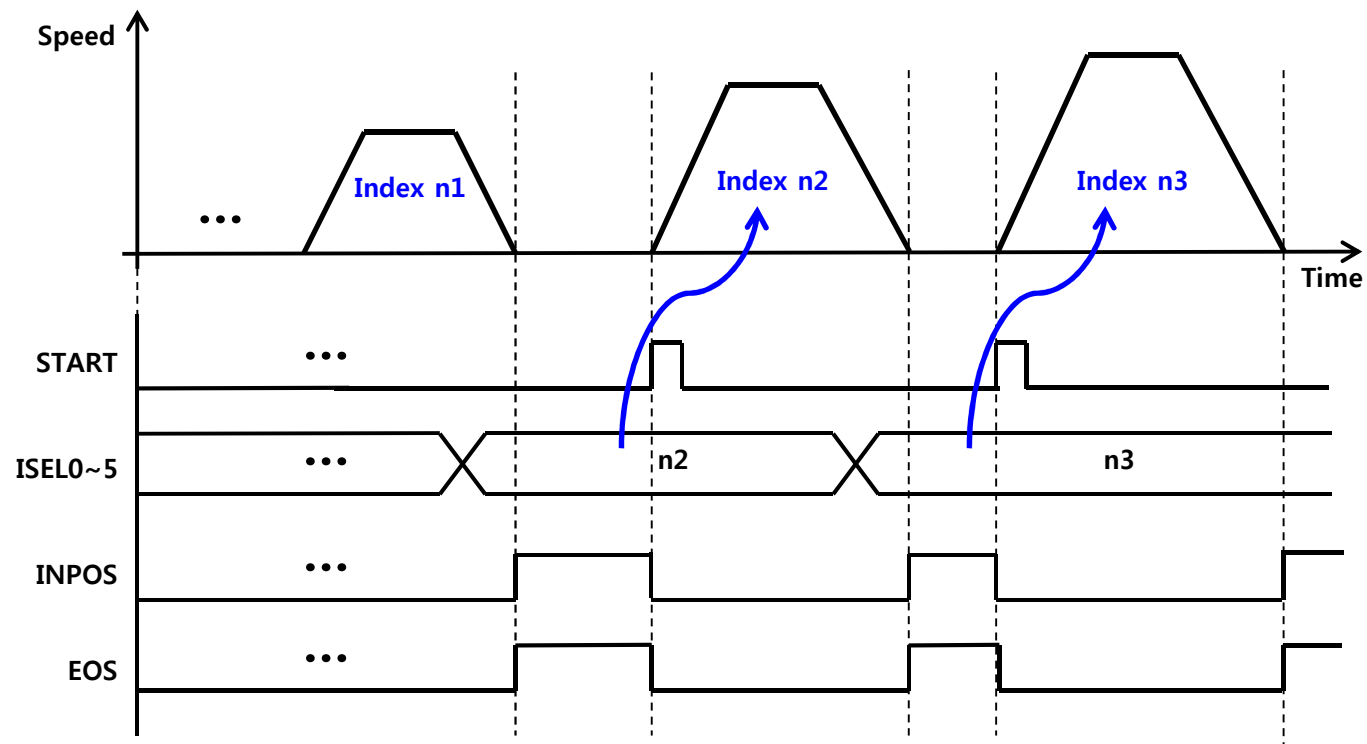


Ex) Index nn : Action = Stop

## Action : Wait for Start

- If the Action of the index is set as Wait for Start (set value 1), the next index is executed by START signal after the relevant index operation is completed.
- The index which is executed upon START signal is determined by the ISEL0 ~ 5 (Index Select) signal regardless of the set value of Next Index.

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	

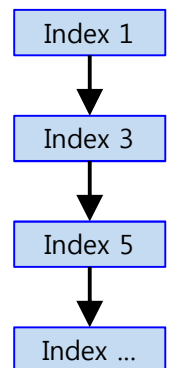
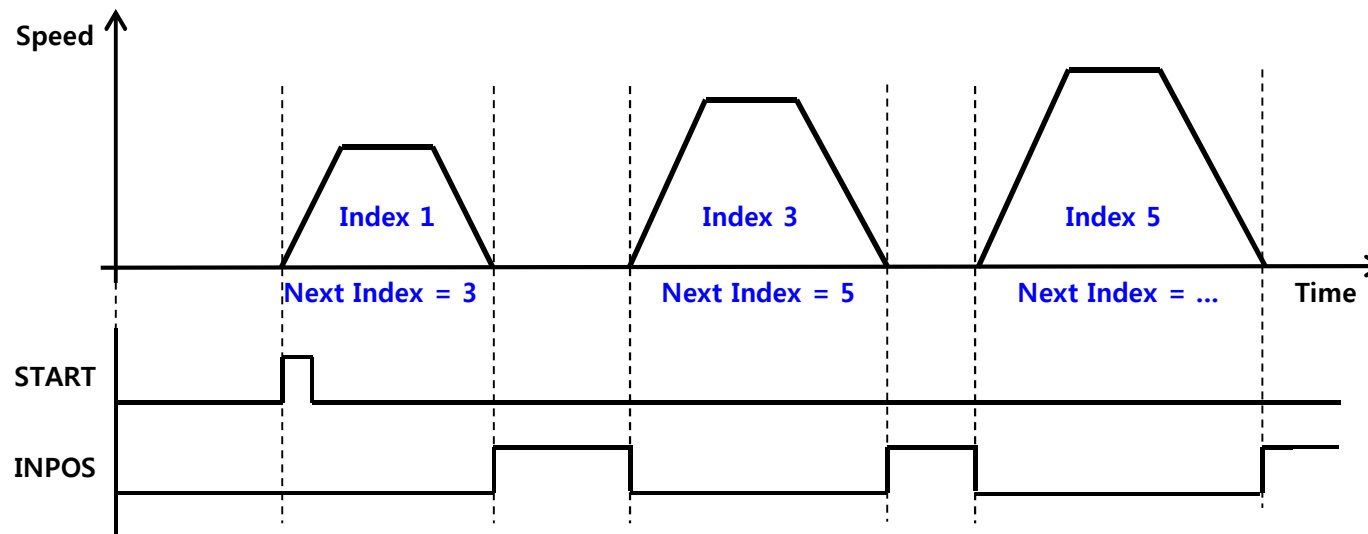


Ex) Index n1, n2 : Action = Wait for Start

## Action : Next Index

- If the Action of the index is set as Next Index(set value 2), the index set as the Next Index automatically begins after the end of the relevant index.
- The preset index automatically begins irrelevant to digital input signals(START, ISEL0 ~ 5). (same as VP5)

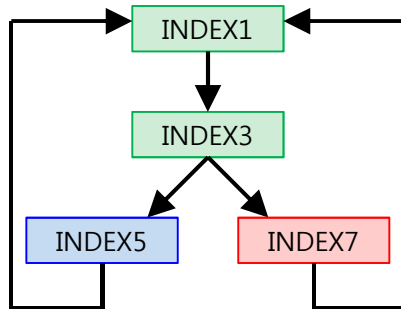
Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
<b>Action</b>	



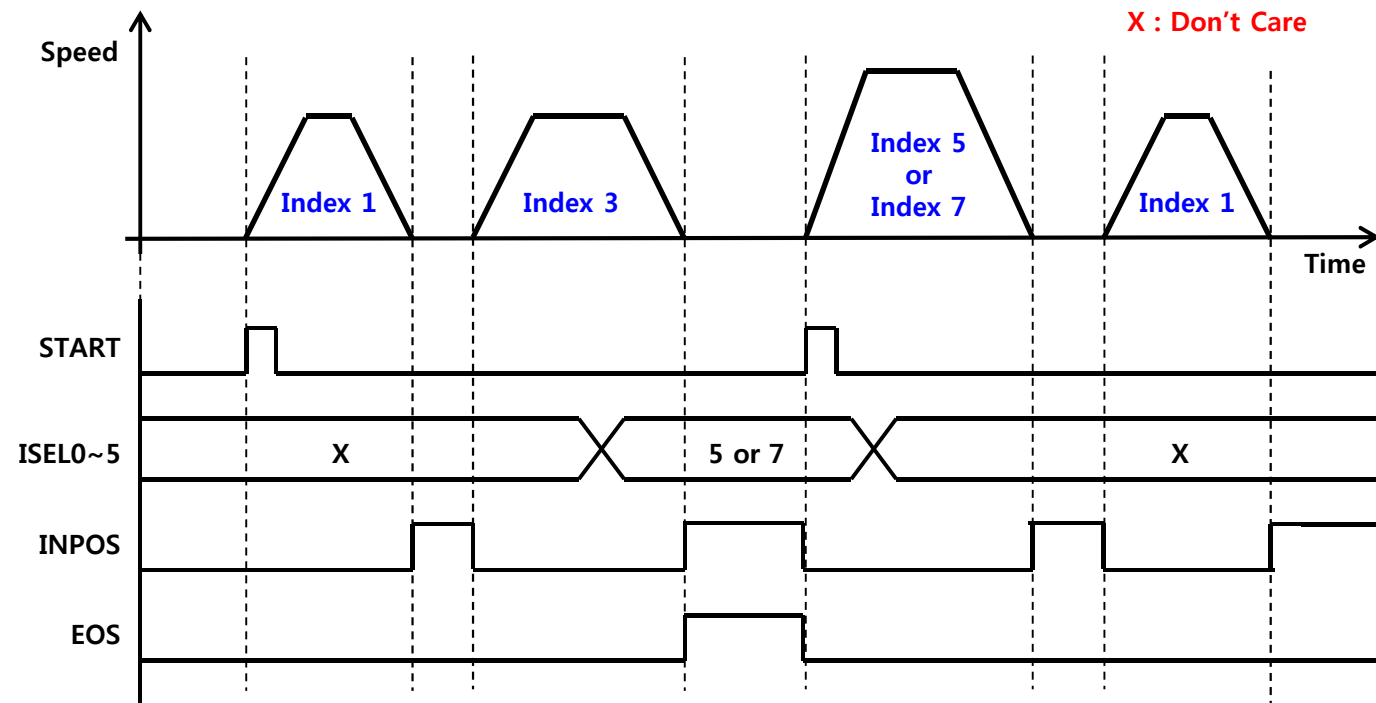
Ex) Index 1 : Next Index = 3, Action = Next Index  
 Index 3 : Next Index = 5, Action = Next Index

# The Example of Action Setting

- By combination Action setting with Wait for Start and the Next Index, a bifurcation flow sequence like a figure below could be possible.



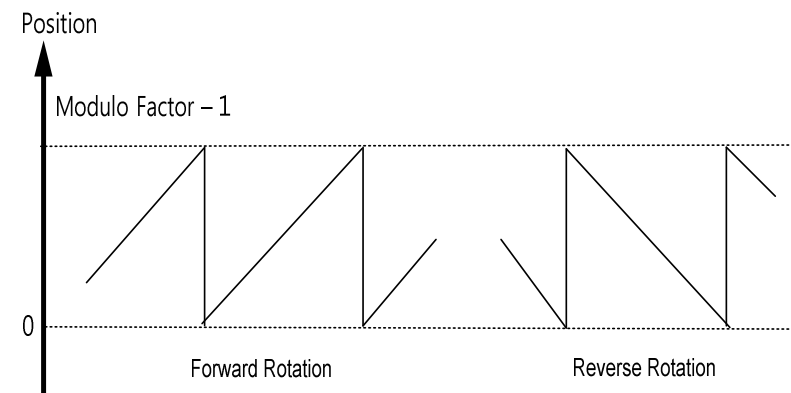
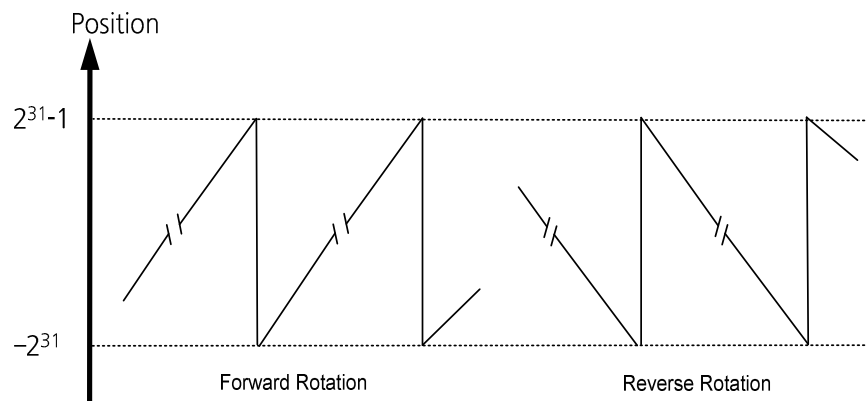
Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	



Ex) Index 1 : Next Index = 3, Action = Next Index  
 Index 3 : Next Index = X, Action = Wait for Start  
 Index 5 : Next Index = 1, Action = Next Index  
 Index 7 : Next Index = 1, Action = Next Index

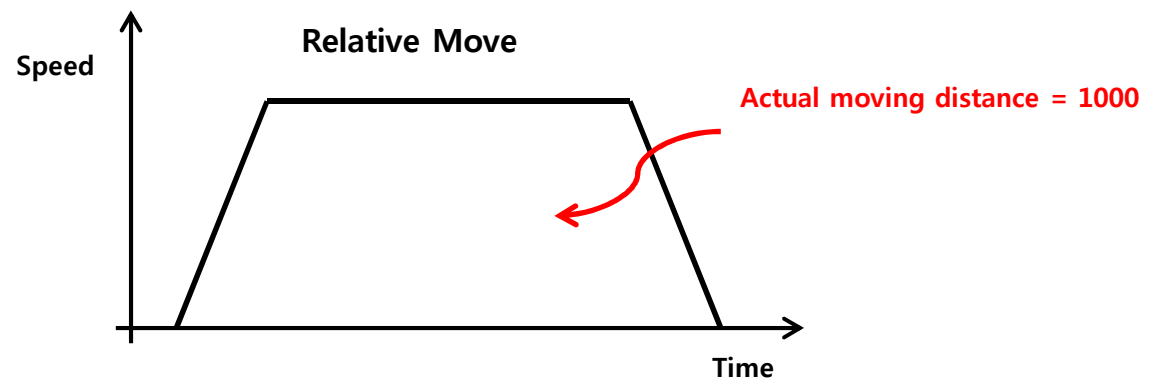
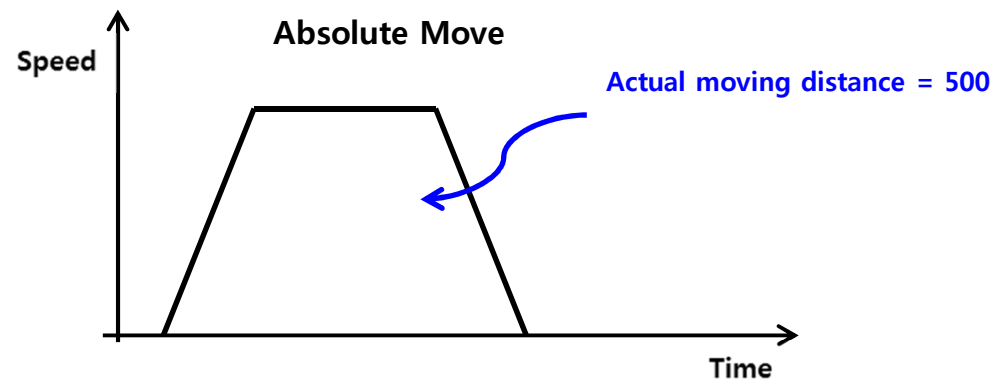
## Index Type : Rotary and Linear

- In Indexing Position mode, the two coordinate types below could be used.
- Linear coordinate axis
  - Linear coordinate expresses the position value within the range from  $-2^{31}$  to  $+2^{31}-1$ .
  - If the value exceeds  $+2^{31}-1$  when rotating forward, it rollover to the lowest value ( $-2^{31}$ ).
  - If the value exceeds  $-2^{31}$  when rotating reverses, it rollover to the highest value ( $+2^{31}-1$ ).
  - Supporting Index Type : Absolute, Relative, Registration Absolute, Registration Relative, Blending Absolute, Blending Relative
- Rotary coordinate axis
  - The rotary coordinate expresses position only with positive value.
  - The expressed range depends on the set value of the Modulo Factor ( $0x240C$ ), with the ranges of  $0 \sim (\text{Modulo Factor}-1)$ .
  - If the value exceeds  $(\text{Modulo Factor}-1)$  when rotating forward, it rollover to the lowest value (0).
  - If the value exceeds 0 when rotating reverse, it rollover to the highest value  $(\text{Modulo Factor}-1)$ .
  - Supporting Index Type : Rotary Absolute, Rotary Relative Move, Rotary Shortest, Rotary Positive, Rotary Negative



# Absolute/Relative Move

- Absolute Move : The actual moving distance is the difference between the distance and the current position. (= Distance - Current position)
- Relative Move : The actual moving distance is the set value of the distance. (= Distance)



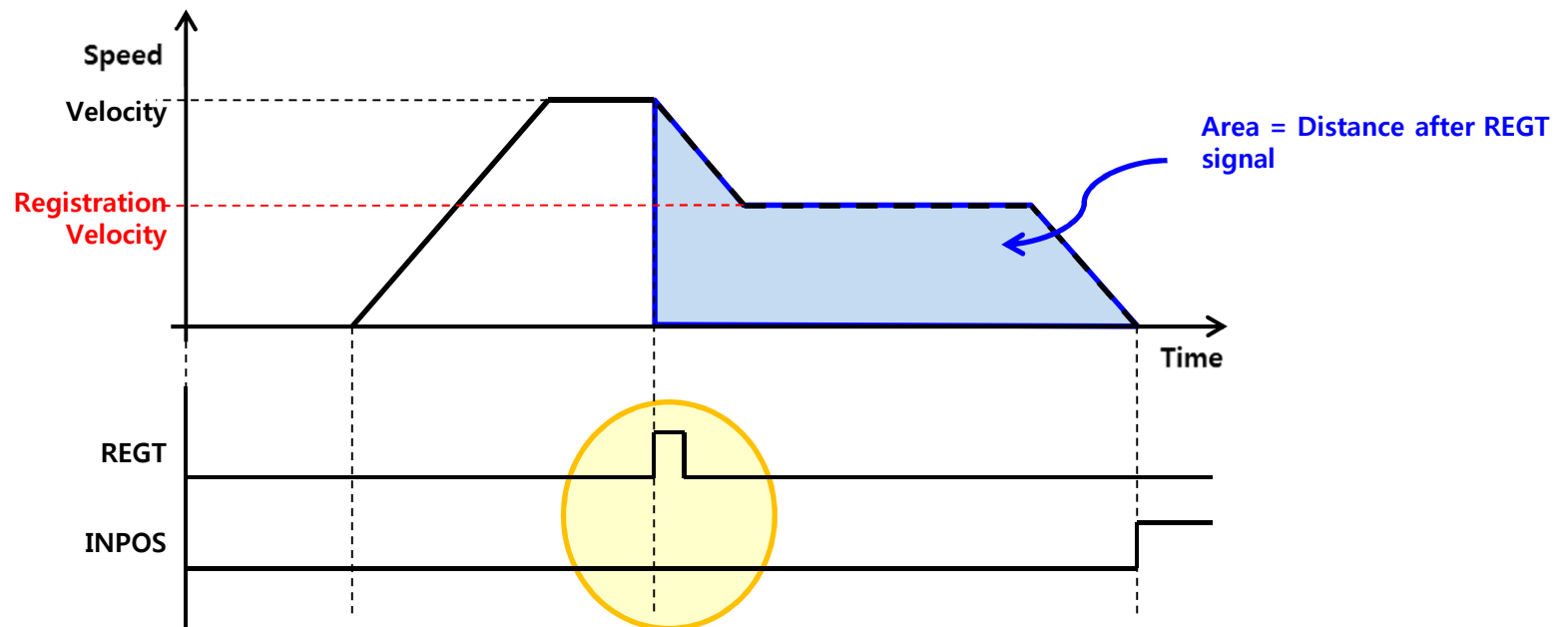
Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	

Ex) Current position = 500, Distance = 1000

## Registration Absolute/Relative Move

- The operation speed and distance could be changed by REGT signal input.
- Registration Absolute /Relative Move : Distance after REGT signal = Registration Distance
- Registration Absolute /Relative Move show same operation with Absolute /Relative Move without REGT input.
- This function is similar to the motion pattern generation function of VP-3(Feeder and Sensor-Input position operation type)

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	

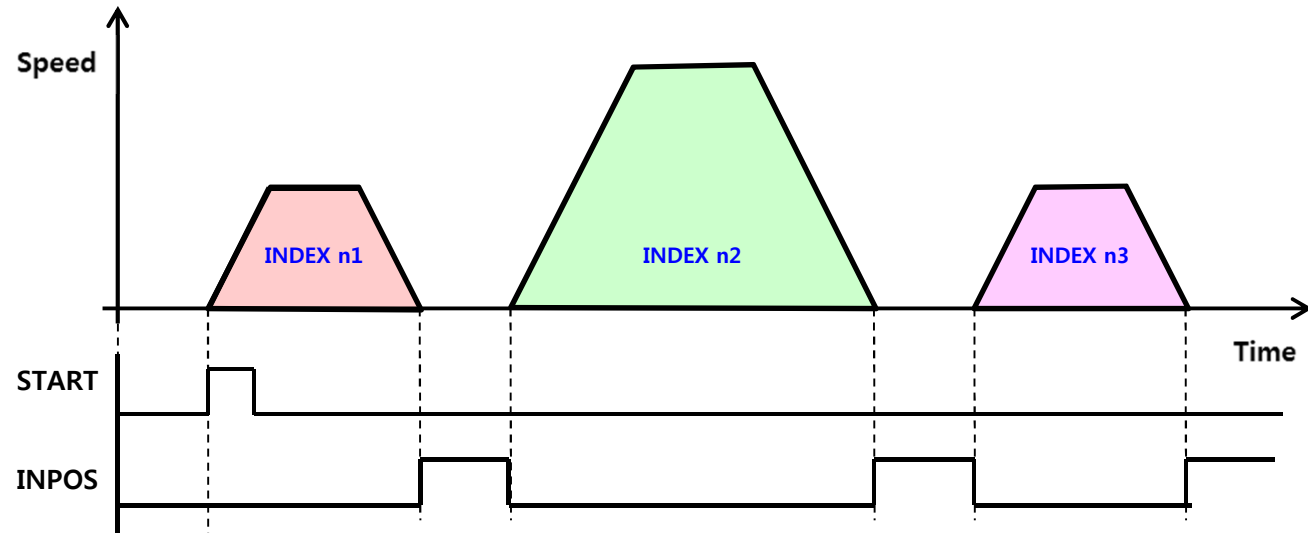




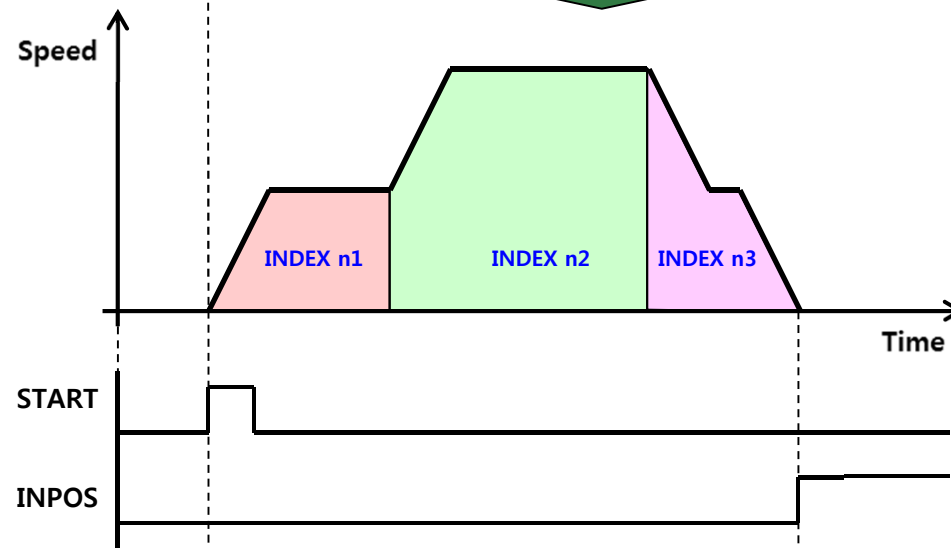
# Blending Absolute/Relative Move

- Performs blending multiple index operations.
- After completion of each index, moves to the next index without stopping with zero speed.

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	



Ex) Index n1: Index Type = Relative  
 Index n2: Index Type = Relative  
 Index n3: Index Type = Relative



Ex) Index n1: Index Type = Relative  
 Index n2: Index Type = Blending Relative  
 Index n3: Index Type = Blending Relative

# Rotary Absolute/Relative Move

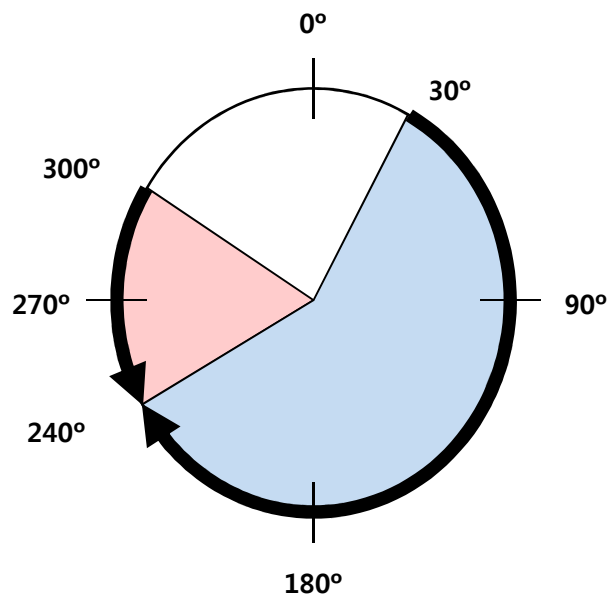
## - Rotary Absolute Move

- Need to use with rotary coordinate setting.
- Rotating direction is determined on current position and command value (motor moves forward if command position is larger than current position and moves backward for opposite case), it could be positive or negative and is not necessarily shortest movement.
- Motor could rotate more than one cycle depend on command value. (Modulo Factor : 0x240C)

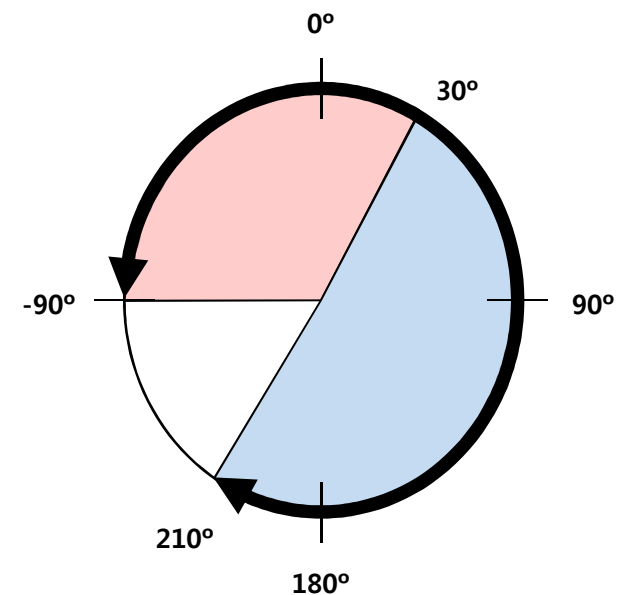
## - Rotary Relative Move

- Need to use with rotary coordinate setting.
- Rotating direction follows sign of distance setting value.
- Motor could rotate more than one cycle depend on command value. (Modulo Factor : 0x240C)

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	



Ex) Rotary Absolute Move  
30° → 240°  
300° → 240°

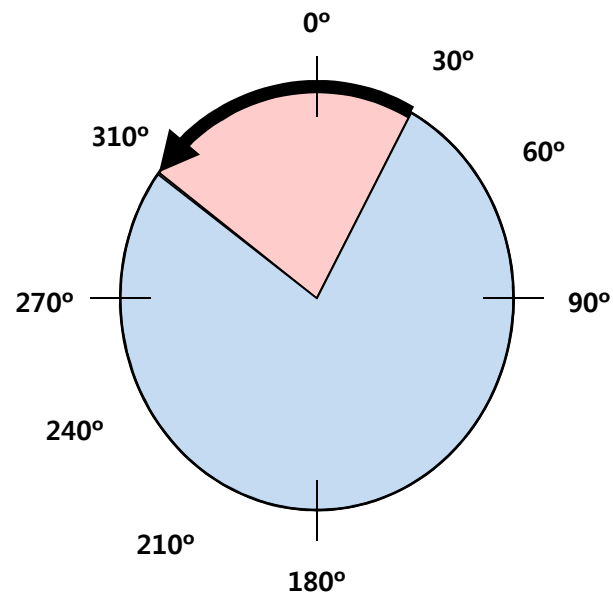


Ex) Rotary Relative Move  
30° → +180°  
30° → -120°

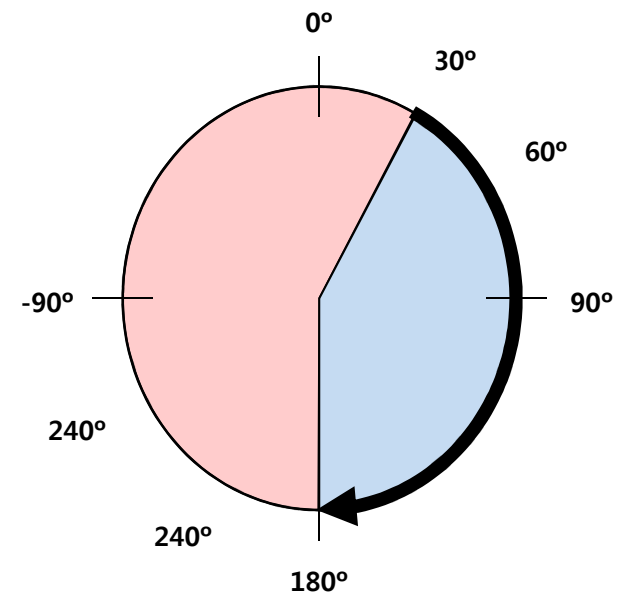
# Rotary Shortest Move

- Need to use with rotary coordinate setting.
- Rotating direction is determined on shortest path to target position.
- Motor could rotate within one cycle. (Modulo Factor : 0x240C)
- Distance set value is process as absolute.

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	



Ex) Rotary Shortest Move  
30° → 310°



Ex) Rotary Shortest Move  
30° → 180°

# Rotary Positive/Negative Move

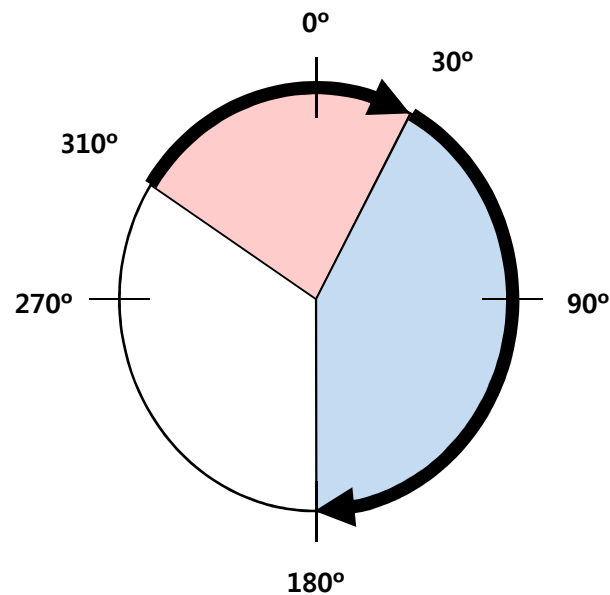
## - Rotary Positive Move

- Need to use with rotary coordinate setting.
- Rotation direction is always positive(forward).
- Motor could rotate within one cycle. (Modulo Factor : 0x240C)
- Distance set value is process as absolute.

## - Rotary Negative Move

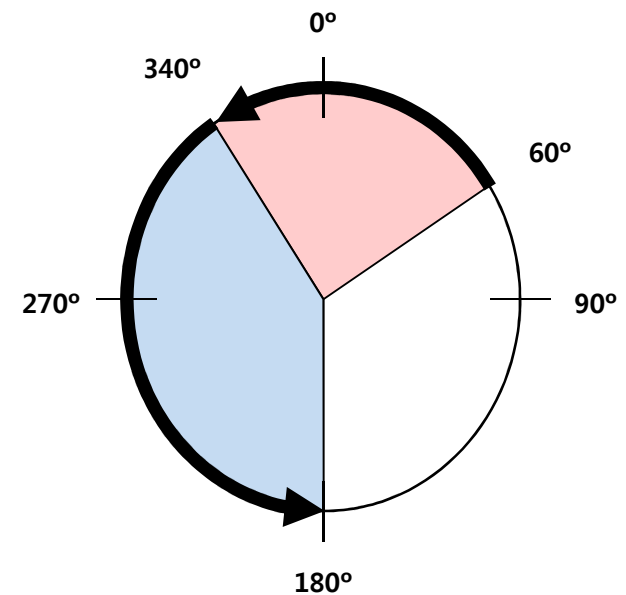
- Need to use with rotary coordinate setting.
- Rotation direction is always negative(backward).
- Motor could rotate within one cycle. (Modulo Factor : 0x240C)
- Distance set value is process as absolute.

Index type	Linear
	Rotary
Distance	
Velocity	
Acceleration	
Deceleration	
Registration distance	
Registration velocity	
Repeat count	
Dwell time	
Next index	
Action	



Ex) Rotary Positive Move

310° → 30°  
30° → 180°



Ex) Rotary Negative Move

60° → 340°  
340° → 180°

**Thanks for your attention!**

**Moving towards tomorrow**

