Panasonic
INDUSTRY

A6_IO-Interface/Modbus Block function's application

2016.10_After 2nd update of firmware Ver 1

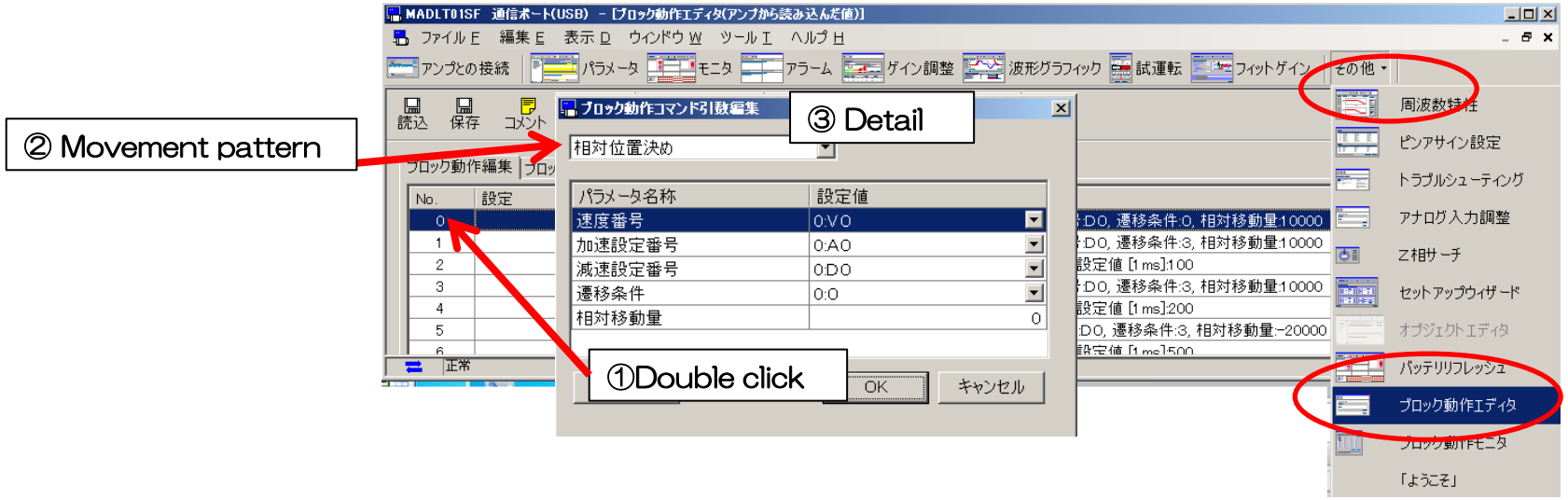
I/O Interface Modbus RTU

Panasonic Industry Co., Ltd.

Basis of Block Operation

How to set up the data

1. Open the 「Block Operation Editor」in 「Other」on PANATERM」
2. Double clock 「Block No.」in the tab of block operation editor.
3. Select the movement pattern and input the suitable setting
4. For instance：Absolute Positioning case；
   Select it and point out the parameter number of velocity, acceleration and deceleration.
   This parameter number is linked to different tab data. So required data shall be set in advance.
5. Transition condition, if selected block is last sequence, the value shall be “0”
   If continuous block operation is necessary, the value shall be “2” or “3”.” 1” is invalid.
   2：Next block starts to move without waiting for finishing the pointed our block.
   Case：synthetic block or transition condition during infinite operation
   3：Next block starts to move after pointed out block is finished.
   Case：Continuous operation like a paying out
6. Distance to be set based on Pr0.08「Command pulse per revolution」



In case that block operation is controlled via Modbus communication (Pr.6.28=1)

Interface signal (I/F) assignment for Position and Full closed control
Following setting shows just a recommendation for initial run.
※ If Servo-On is assigned, the Coil signal AND this shall be ON when servo -on executes

★ Changed by Pin Assignment function :

Pin number	Position / Full-closed control	Velocity control	Torque control
08 (SI1)	POT_ConnectA		
09 (SI2)	NOT_ConnectA		
26 (SI3)	VS-SEL1_ConnectA		
27 (SI4)	HOME_ConnectA		
28 (SI5)	DIV1_ConnectA		
29 (SI6)	H-STOP_ConnectA		
30 (SI7)	S-STOP_ConnectA		
31 (SI8)	A-CLR_ConnectA		
32 (SI9)	C-MODE_ConnectA		
33 (SI10)	INH_ConnectB		

Class	No.	Parameter name	Setup range		Set value	Unit
04	000	SI1 input selection	0–	16777215	8553090	---
04	001	SI2 input selection	0–	16777215	8487297	---
04	002	SI3 input selection	0–	16777215	9539850	---
04	003	SI4 input selection	0–	16777215	394758	---
04	004	SI5 input selection	0–	16777215	4108	---
04	005	SI6 input selection	0–	16777215	197379	---
04	006	SI7 input selection	0–	16777215	3847	---
04	007	SI8 input selection	0–	16777215	263172	---
04	008	SI9 input selection	0–	16777215	328965	---
04	009	SI10 input selection	0–	16777215	3720	---

Pin number	Position / Full-closed control	Velocity control	Torque control
10/11 (SO1)	BUSY		
12/41 (SO5)	ZSP		
34/35 (SO2)	B-CTRL1		
36/37 (SO3)	B-CTRL2		
38/39 (SO4)	B-CTRL3		
40/41 (SO6)	B-CTRL5		

Class	No.	Parameter name	Setup range		Set value	Unit
04	010	SO1 output selection	0–	16777215	197379	---
04	011	SO2 output selection	0–	16777215	131586	---
04	012	SO3 output selection	0–	16777215	65793	---
04	013	SO4 output selection	0–	16777215	328964	---
04	014	SO5 output selection	0–	16777215	460551	---
04	015	SO6 output selection	0–	16777215	394758	---

★ Changed by Parameter change

How to Move

1. 「Servo-On」 ⇒ Coil No. 0060h 「ON」
2. Point out 「Block No.」 ⇒ Write 「Block No.」 into resister No. 4414h
3. 「STB ON」 ⇒ Coil No. 0120h 「ON」 ※ Pr5.42=4 ： STB Automatic OFF

In case that block operation is controlled by I/O signal (Pr.6.28=2)

Interface signal (I/F) assignment for Position and Full closed control
Following setting shows just a recommendation for initial run.

★ Changed by Pin Assignment function :

Pin number	Position / Full-closed control	Velocity control	Torque control
08 (SI1)	POT_ConnectA		
09 (SI2)	NOT_ConnectA		
26 (SI3)	VS-SEL1_ConnectA		
27 (SI4)	HOME_ConnectA		
28 (SI5)	DIV1_ConnectA		
29 (SI6)	H-STOP_ConnectA		
30 (SI7)	S-STOP_ConnectA		
31 (SI8)	A-CLR_ConnectA		
32 (SI9)	C-MODE_ConnectA		
33 (SI10)	INH_ConnectB		

Class	No.	Parameter name	Setup range	Set value	Unit
04	000	SI1 input selection	0– 16777215	8553090	---
04	001	SI2 input selection	0– 16777215	8487297	---
04	002	SI3 input selection	0– 16777215	9539850	---
04	003	SI4 input selection	0– 16777215	394758	---
04	004	SI5 input selection	0– 16777215	4108	---
04	005	SI6 input selection	0– 16777215	197379	---
04	006	SI7 input selection	0– 16777215	3847	---
04	007	SI8 input selection	0– 16777215	263172	---
04	008	SI9 input selection	0– 16777215	328965	---
04	009	SI10 input selection	0– 16777215	3720	---

Pin number	Position / Full-closed control	Velocity control	Torque control
10/11 (SO1)	BUSY		
12/41 (SO5)	ZSP		
34/35 (SO2)	B-CTRL1		
36/37 (SO3)	B-CTRL2		
38/39 (SO4)	B-CTRL3		
40/41 (SO6)	B-CTRL5		

Class	No.	Parameter name	Setup range	Set value	Unit
04	010	SO1 output selection	0– 16777215	197379	---
04	011	SO2 output selection	0– 16777215	131586	---
04	012	SO3 output selection	0– 16777215	65793	---
04	013	SO4 output selection	0– 16777215	328964	---
04	014	SO5 output selection	0– 16777215	460551	---
04	015	SO6 output selection	0– 16777215	394758	---

★ Changed by Parameter change

How to Move

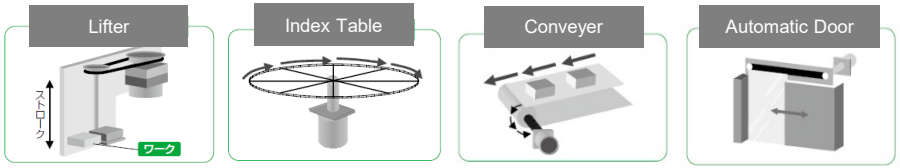
1. 「Servo ON」 ⇒ Short SRV-ON (Pin29) and COM-(Pin41)
2. Point out 「Block No.」 ⇒ Set the Binary number by B-SEL1-256
   For instance, B-SEL_2 : ON/_1 : OFF
3. 「STB ON」 ⇒ Short STB(Pin26) and COM-(Pin41) for more than 2ms and OFF.

Block Operation Example 1

1. Block No.0 Incremental Positioning

● Operation ：Motor is operate as per fixed operating
- For instance, 10000 pulse by incremental operation
- Absolute Positioning is effective for reciprocates operating, but incremental operating is effective for one-direction and constant distance operating.
- By changing Block No. the movement becomes changeable.
- Block No. is fixed and changing block data and velocity and so on via Modbus is also available before execute the operating command.

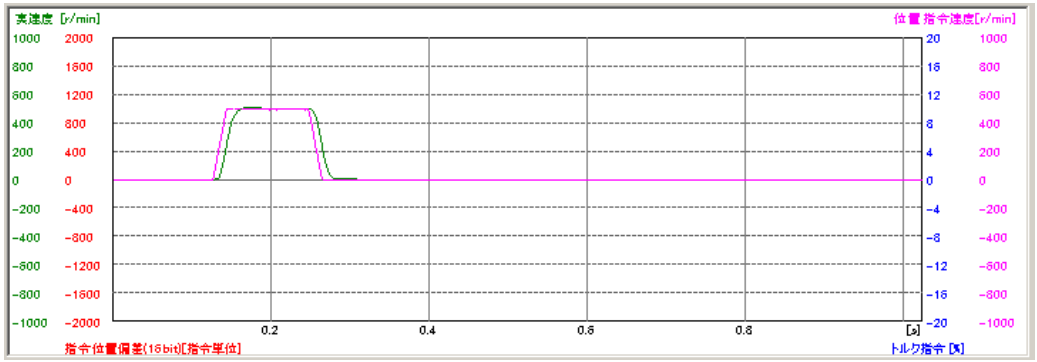
● Application ：Lift-up and down for PCB cassette at fixed distance
Index table, Rotary mechanism at fixed angle
Open and Close operation for a door and shutter



● How to Set ：

0	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:0, Relative movement distance:10000

● Waveform ：

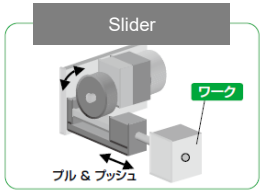


Block Operation Example 2

2. Block No. 0 to 4　Incremental Positioning（Same as Absolute）
Continuous 3 block operation.

● Operation ：Decrement counter defines the stop time and execute continuous operation.
- Transition condition sets to “3” and transit to the next block when pointed out block is finished.
- Transition condition sets “0” at last block
- 10000 pulse move ⇒１００m s stop⇒10000 pulse move⇒200m s stop ⇒-20000 pulse move ⇒ Stop

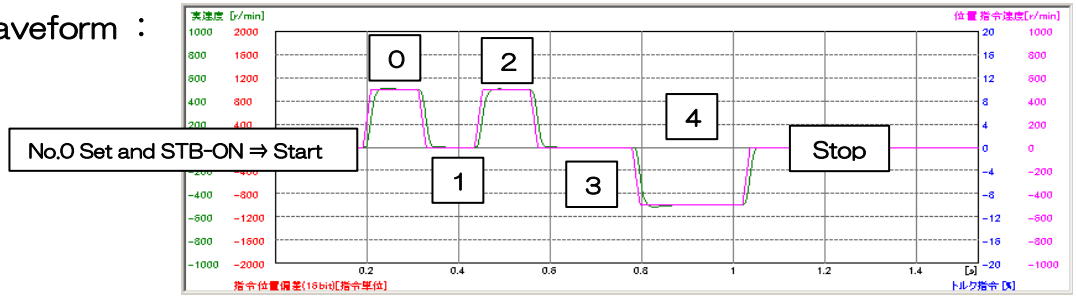
● Application ： Sorting machine to work out
Set the processing product
Reduction of PLC load



● How to Set ：

0	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance:10000
1	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:100
2	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance:10000
3	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:200
4	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:0, Relative movement distance:-20000

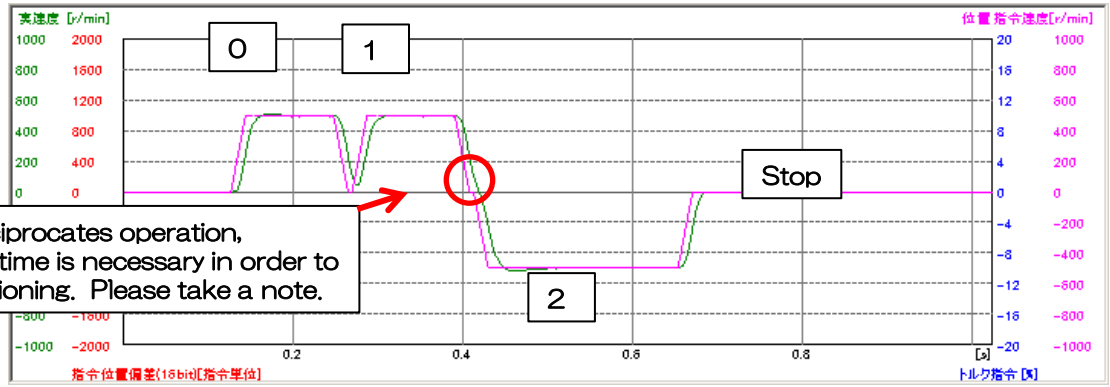
● Waveform ：



Block Operation Example 2

■ In case that decrement counter (stop time) is not used :

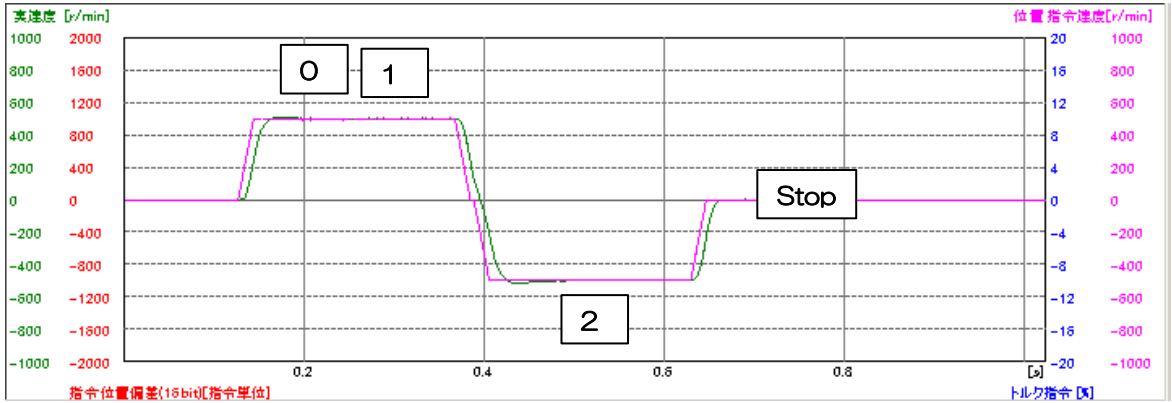
0	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance:10000
1	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance:10000
2	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:0, Relative movement distance:-20000



In case of reciprocates operation, enough stop time is necessary in order to fix each positioning. Please take a note.

■ In case that decrement counter is not used and Transition condition is “2”.

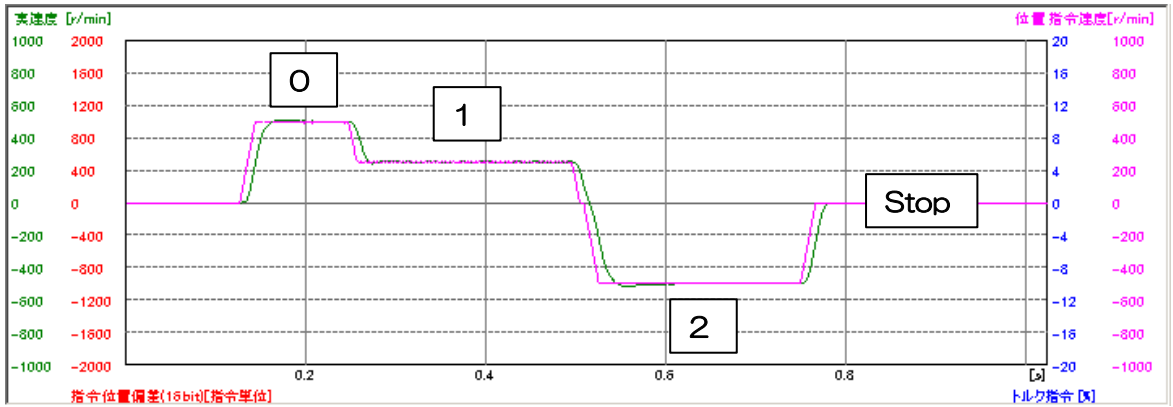
No.	Setting
0	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:2, Relative movement distance:10000
1	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:2, Relative movement distance:10000
2	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:0, Relative movement distance:-20000



Block Operation Example 2

■ In case that decrement counter is not used And Transition condition is “2”
And change the velocity No.V0 to V1

No.	Setting
0	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:2 Relative movement distance...
1	Relative positioning, Velocity No.:V1, Acceleration No.:A0, Deceleration No.:D0, Transition condition:2 Relative movement distance...
2	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:0, Relative movement distance...



Block Operation Example 3

Block operation 3 to 5 are available for cost reduction proposal like PLC less as per detail of profile.

3. In case that Block No.0 to 6, Incremental Positioning (as same as Absolute), continuous block operation (when stop, deceleration stop is required.)

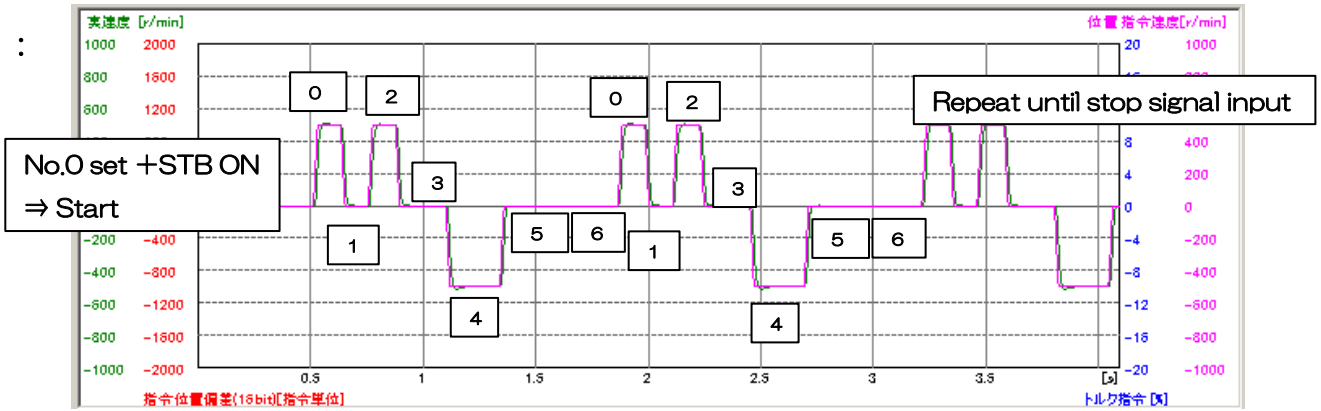
● Operation ：Decrement counter makes stop time set and continuous operation.

- Transition condition to be set “3”, point out block No. and move to next block No.
- For the transition condition to the last block, “3” and jump to block No.0
- 10000 pulse move → 100ms stop → 10000pulse move → 200ms stop → 20000pulse move → 500ms stop → To Block No.0
- To stop the sequence, deceleration stop input is necessary to close block operation.

● How to Set ：

No.	Setting
0	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance...
1	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:100
2	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance...
3	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:200
4	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance...
5	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:500
6	Jump, Block No.:0, Transition condition:3

● Waveform ：



Block Operation Example 4

4. In case that Block No.0 to 6, Incremental Positioning (as same as Absolute), temporary stop

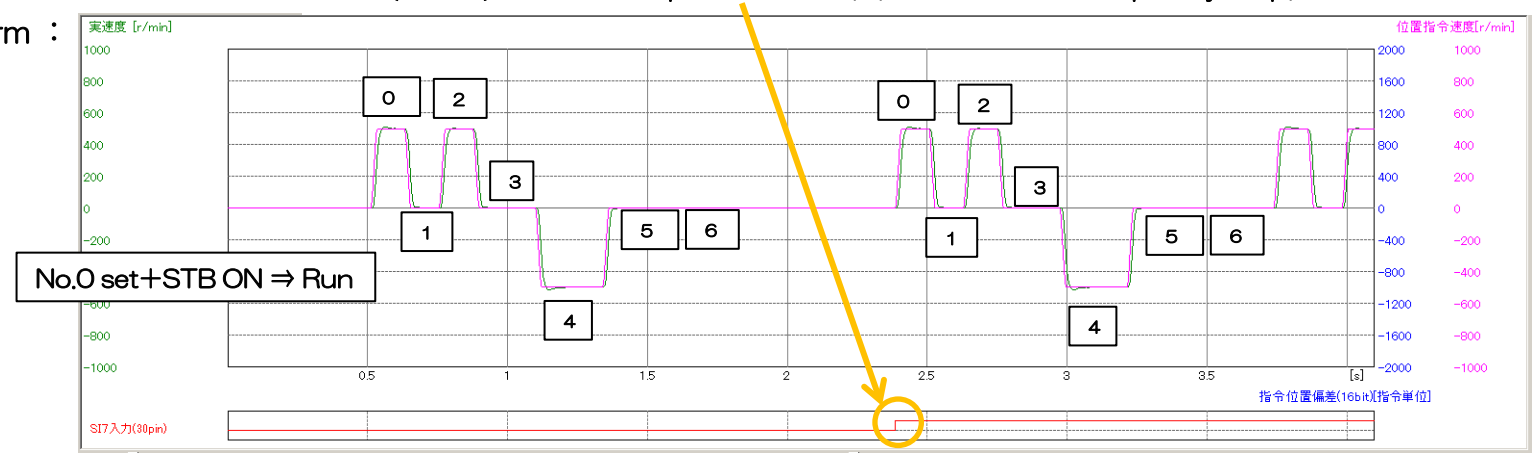
● Operation ：Decrement counter makes stop time set and continuous operation.
- Transition condition to be set “3”, pointed out block No is finished, move to the next block
- To set the transition condition that SI7 (pin30) High makes it move to block No.0.
- 10000 pulse move → 100ms stop → 10000 pulse move → 200ms stop → 20000 pulse move → 500ms stop → If SI7 is H, to block No.0, if SI7 is L, keep stopping until SI7 is H.
- SI7 “L” or deceleration stop signal is necessary to stop the sequence.

● How to Set ： SI7 Pr4.06=3847 (CL: Counter clear) ⇒ 0(No pin assignment)

No.	Setting
0	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance...
1	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:100
2	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance...
3	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:200
4	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance...
5	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:500
6	Conditional branching(=), Comparison target:Command position, Block No.:0, Transition condition:3, Comparison value(limit value):4...

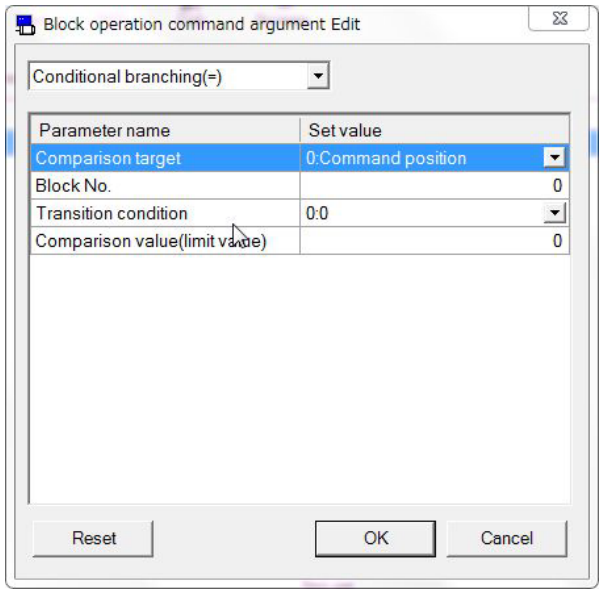
SI7（Pin30）” H” ：Jump to block No.0. “L” means temporary stop.

● Waveform ：



Block Operation Example 4

■ How to set the transition condition (in detail):



1. Select "Transition condition"
2. Comparison : Set to Input signal
3. If the condition is satisfied, the executed block No. is set to "0".
4. Set the transition condition to "3", after current block No. is finished, transit to the pointed block No.
5. Input Comparison value "4194368"

★ Howe to set Comparison value :
Target input signal in this case : SI7
Available Setting : HL bit6 "1" ⇒ To compare
Signal condition Setting : LL bit6 "1" ⇒ "H" is compared

Compared value (4 byte)		bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Function	Byte								
Signal condition	LL	SI8	SI7	SI6	SI5	SI4	SI3	SI2	SI1
	LH	-	-	-	-	-	-	SI10	SI9
With or without comparison	HL	SI8	SI7	SI6	SI5	SI4	SI3	SI2	SI1
	HH	-	-	-	-	-	-	SI10	SI9

HH / HL / LH / LL

0000 0000 / 0100 0000 / 0000 0000 / 0100 0000 = 4194368

Binary number ⇒ Decimal number

Block Operation Example 5

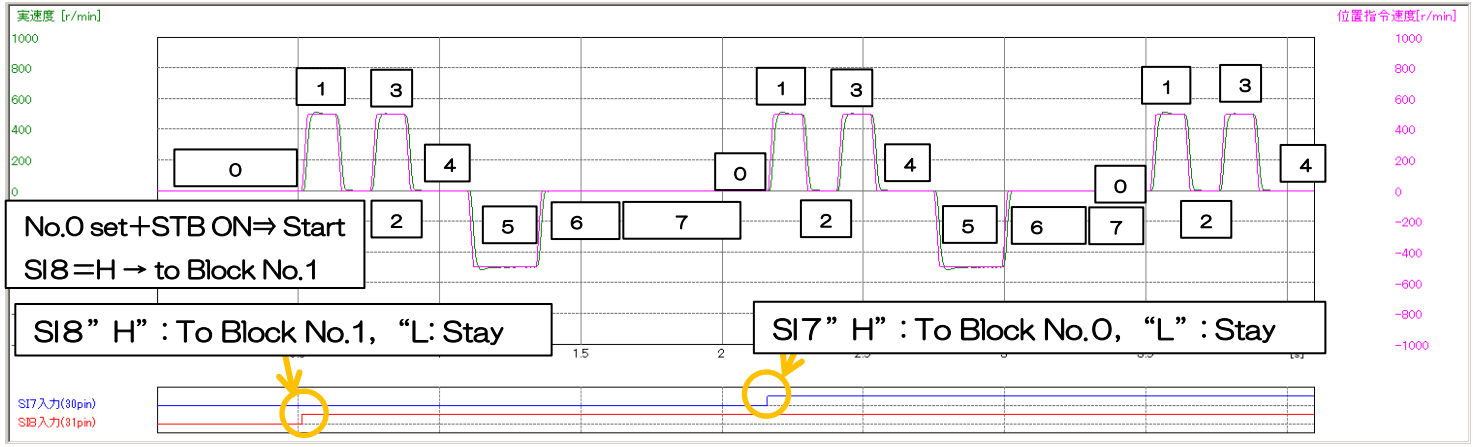
5. In case that Block No.0 to 7, Incremental Positioning (as same as Absolute), temporary stop by 2 inputs

● Operation ：Decrement counter make a stop time setting, and continuous operation.
- First block No. is defined as transition condition
- SI8 (Pin31) becomes “L” (Run) waiting at No.0, and “H” move to No.1 transition condition “3”：continuous operation, and finally SI7 (pin30) “H”：move to block No.0.

● How to Set ： SI7 Pr4.06=3847(CL：Counter clear ⇒ 0(No pin assignment)
SI8 Pr4.07=263172(ALM clear) ⇒ 0(No pin assignment

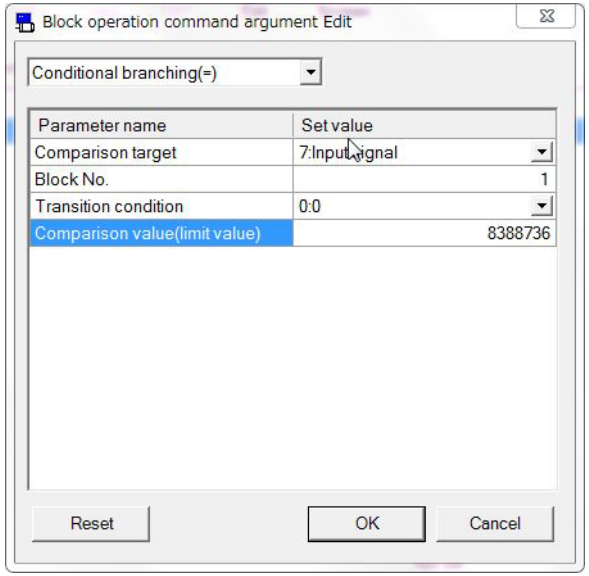
No.	Setting
0	Conditional branching(=), Comparison target:Input signal, Block No.:1, Transition condition:3, Comparison value(limit value):8388736
1	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance...
2	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:100
3	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance...
4	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:200
5	Relative positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Relative movement distance...
6	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:500
7	Conditional branching(=), Comparison target:Command position, Block No.:0, Transition condition:3, Comparison value(limit value):4...

● Waveform ：



Block Operation Example 5

■ How to set the transition condition : Block No.0



1. Select “Transition condition”
2. Comparison : Set to Input signal
3. If the condition is satisfied, the executed block No. is set to “1”.
4. Set the transition condition to “3”, after current block No. is finished, transit to the pointed block No.
5. Input Comparison value “8388736”

★ Howe to set Comparison value :
Target input signal in this case : SI8
Available Setting : HL bit7 “1” ⇒ To compare
Signal condition Setting : LL bit7 “1” ⇒ “H” is compared

Compared value (4 byte)		bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Function	Byte								
Signal condition	LL	SI8	SI7	SI6	SI5	SI4	SI3	SI2	SI1
	LH	-	-	-	-	-	-	SI10	SI9
With or without comparison	HL	SI8	SI7	SI6	SI5	SI4	SI3	SI2	SI1
	HH	-	-	-	-	-	-	SI10	SI9

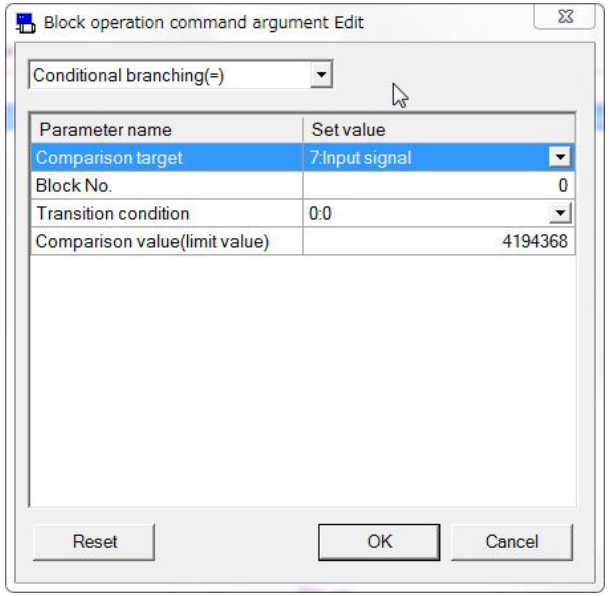
HH / HL / LH / LL

0000 0000 / 1000 0000 / 0000 0000 / 1000 0000 = 8388736

Binary number ⇒ Decimal number

Block Operation Example 5

■ How to set the transition condition : Block No.7



1. Select “Transition condition”
2. Comparison : Set to Input signal
3. If the condition is satisfied, the executed block No. is set to “0”.
4. Set the transition condition to “3”, after current block No. is finished, transit to the pointed block No.
5. Input Comparison value “4194368”

★ Howe to set Comparison value :
Target input signal in this case : SI7
Available Setting : HL bit6 “1” ⇒ To compare
Signal condition Setting : LL bit6 “1” ⇒ “H” is compared

Compared value (4 byte)		bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Function	Byte								
Signal condition	LL	SI8	SI7	SI6	SI5	SI4	SI3	SI2	SI1
	LH	-	-	-	-	-	-	SI10	SI9
With or without comparison	HL	SI8	SI7	SI6	SI5	SI4	SI3	SI2	SI1
	HH	-	-	-	-	-	-	SI10	SI9

HH / HL / LH / LL

0000 0000 / 0100 0000 / 0000 0000 / 0100 0000 = 4194368

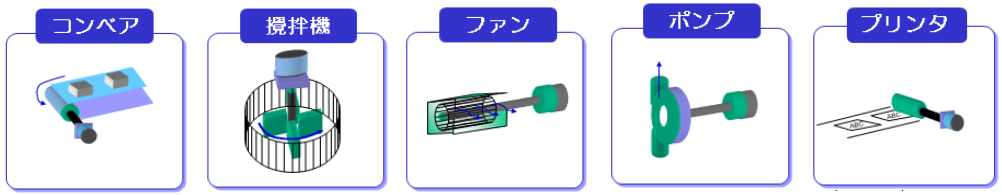
Binary number ⇒ Decimal number

Block Operation Example 6

6. Block No.0 : JOG Operation (Constant speed)

● Operation ：Constant speed operation is available for Jog operation.
Deceleration stop input is necessary to stop Jog operation.

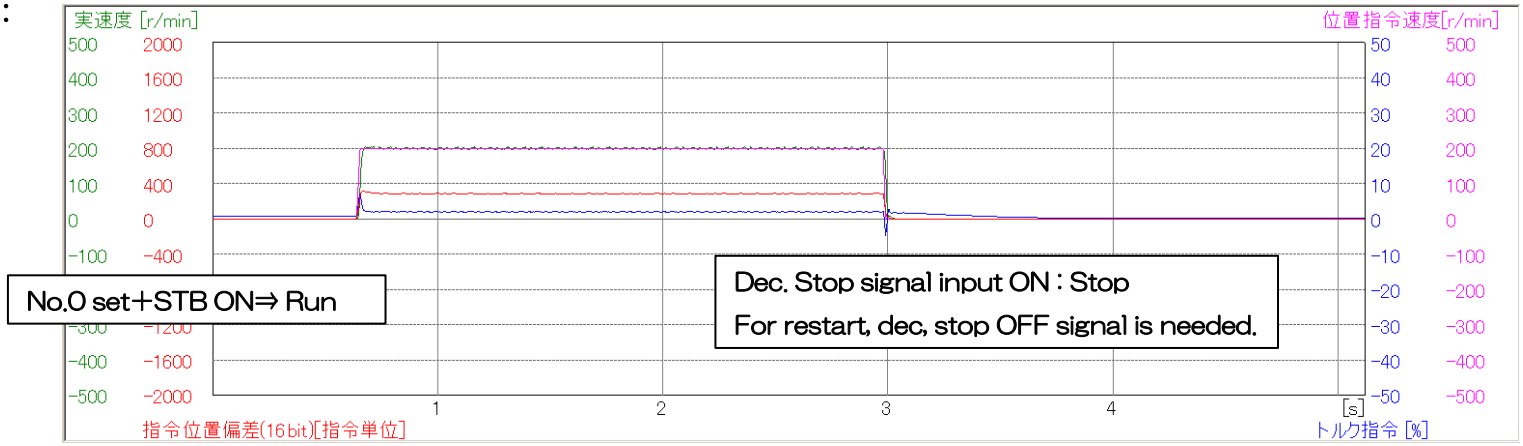
Application example ：Conveyer, Agitator, Fan, Pump, Printer, Dispenser → Continuous feed operation



● How to Set ：

No.	Setting
0	JOG, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, JOG direction:Positive side, Transition condition:0

● Waveform ：

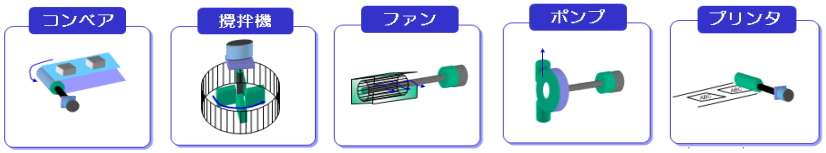


Block Operation Example 7

7. Block No.0 to 5 : JOG Operation (Constant speed) and change speed via external input

● Operation : Constant speed operation is available for Jog operation.
Deceleration stop input is necessary to stop Jog operation.
This shows 2-speeds transmission. If more that 2-speed is necessary, velocity parameter is changed via Modbus directly before transition condition is valid.

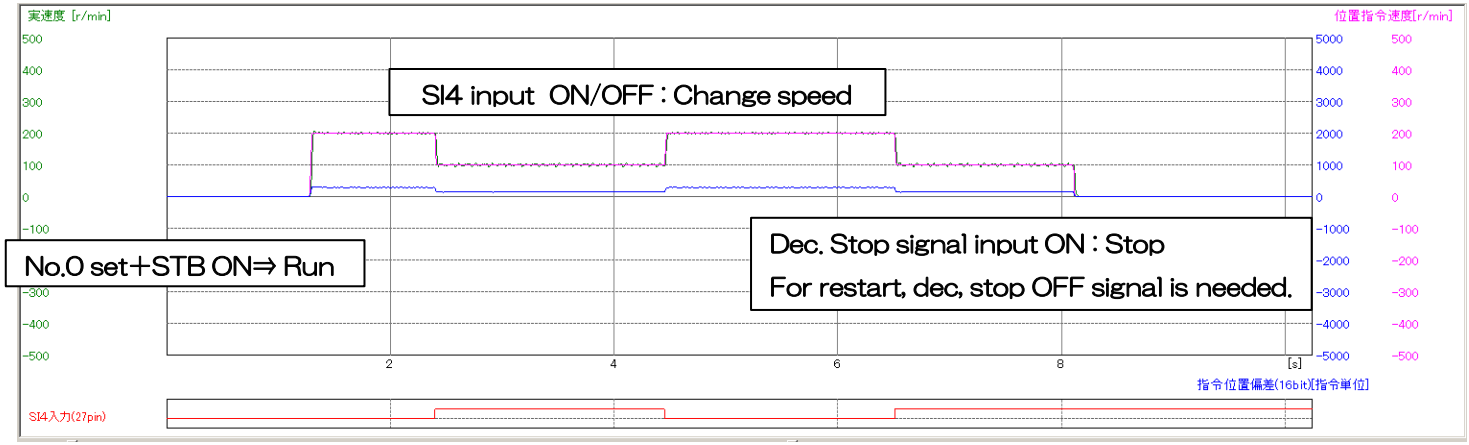
Application example :



● How to Set :

No.	Setting
0	JOG, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, JOG direction:Positive side, Transition condition:3
1	Conditional branching(=), Comparison target:Input signal, Block No.:2, Transition condition:3, Comparison value(limit value):524296
2	Speed updated, Velocity No.:V1, JOG direction:Positive side, Transition condition:2
3	Conditional branching(=), Comparison target:Input signal, Block No.:4, Transition condition:3, Comparison value(limit value):524288
4	Speed updated, Velocity No.:V0, JOG direction:Positive side, Transition condition:2
5	Jump, Block No.:1, Transition condition:3

● Waveform :



Block Operation Example 8

8. Block No.50 to 54 : JOG Operation And Torque limit And Zero position homing

● Operation ：Absolute zero position is defined by homing. (Pre-operation is needed)
Start a jog operation at constant speed and hit it to the work and start to charge torque limit (e.g. 20%). TLC signal becomes “H” and decelerated-stop . (Command stop, remain pulse deviation → keep torque limit)
Count up timer 1000ms (holding torque time), and home to 0 position and stop. Torque limit is changeable at Pr0.013.
Application example ： Screw tighten, Press fit etc.

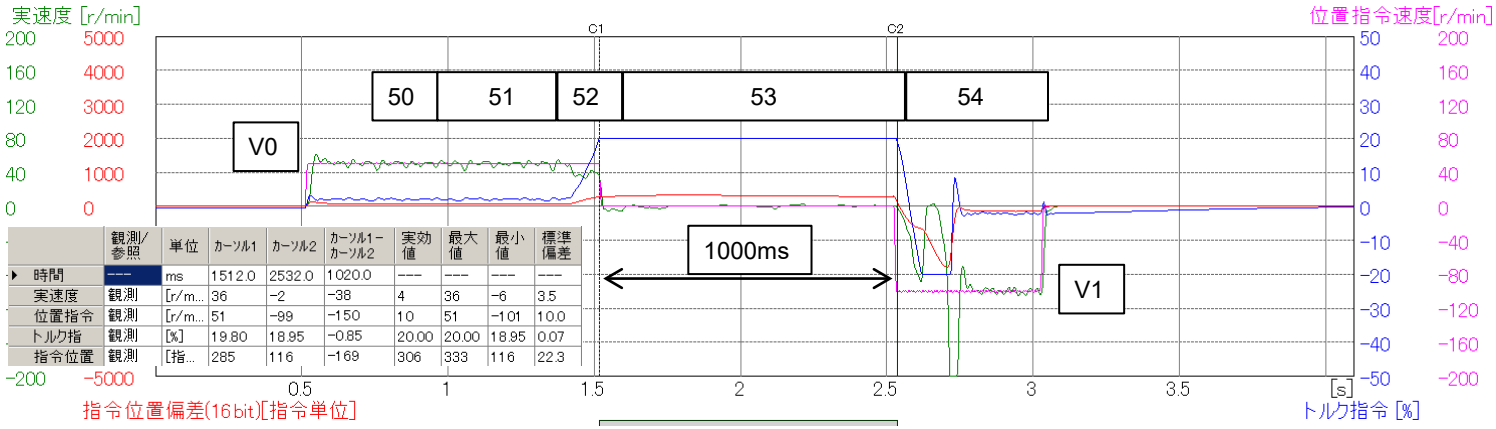
● How to Set ：

50	JOG, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, JOG direction:Positive side, Transition condition:3
51	Conditional branching(=), Comparison target:Output signal, Block No.:52, Transition condition:3, Comparison value(limit value):20971...
52	Deceleration to stop, Stop mode:Deceleration stop, Transition condition:3
53	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:1000
54	Absolute positioning, Velocity No.:V1, Acceleration No.:A0, Deceleration No.:D0, Transition condition:0, Absolute position:0

Compared value (4 byte)		bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Function	Byte								
Signal condition	LL	-	-	TLC	ZSP	BRK-OFF	INP	ALM	S-RDY
	LH	-	INP2	-	WARN2	WARN1	-	-	-
With or without comparison	HL	-	-	TLC	ZSP	BRK-OFF	INP	ALM	S-RDY
	HH	-	INP2	-	WARN2	WARN1	-	-	-

Comparison value
2097184 ⇒ HH_00000000
HL_00010000
LH_00000000
LL_00010000
TLC ON : To next block

● Waveform ：



Block Operation Example 9

9. Block No.0 to 4： Shortcut operation (Absolute operation with battery backup)

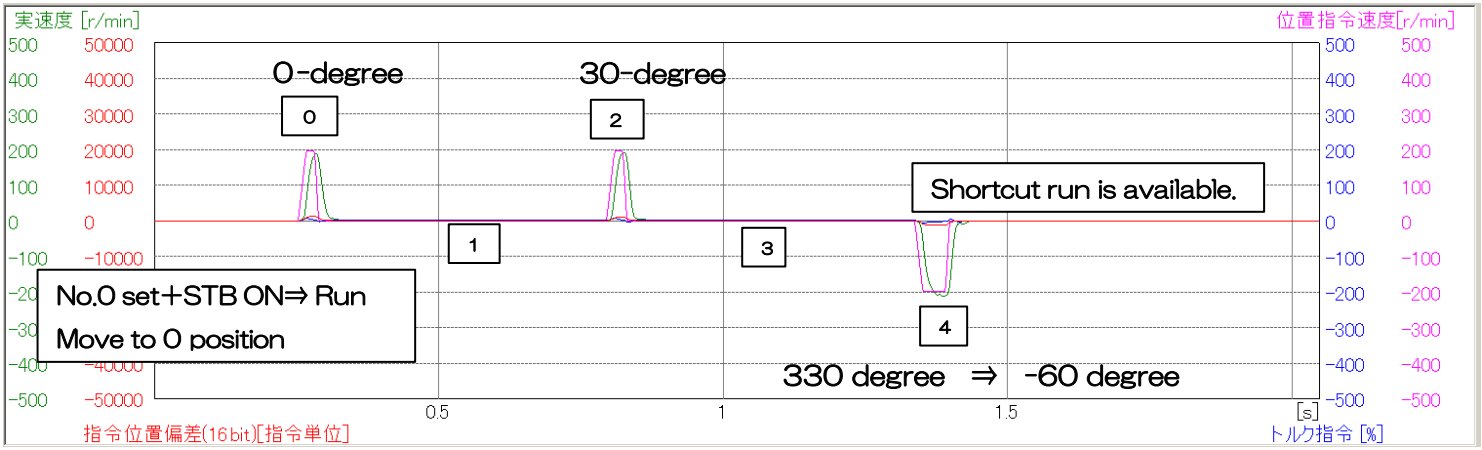
● Operation ：When move to absolute 0 position, shortcut movement CW or CCW is activate.
Range of 1 rotation movement at load side is defined by pulse per revolution and upper limit of abs. ,multi-turn data.
Application example ：Tool changer fro machine tool etc.

● How to Set ：

Pulse per revolution Pr0.008=36000
Absolute encoder setting Pr0.015=4 (Infinite rotation absolute)
Upper limit of absolute multi-turn data :Pr6.088=0
(When motor and Machine is 1 to 1 , reduction ration "n" shall be set "n-1.

No.	Setting
0	Absolute positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Absolute position:0
1	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:500
2	Absolute positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:3, Absolute position:3000
3	Start-up decrement counter, Transition condition:3, Counter setting value[1ms]:500
4	Absolute positioning, Velocity No.:V0, Acceleration No.:A0, Deceleration No.:D0, Transition condition:0, Absolute position:33000

● Waveform ：

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