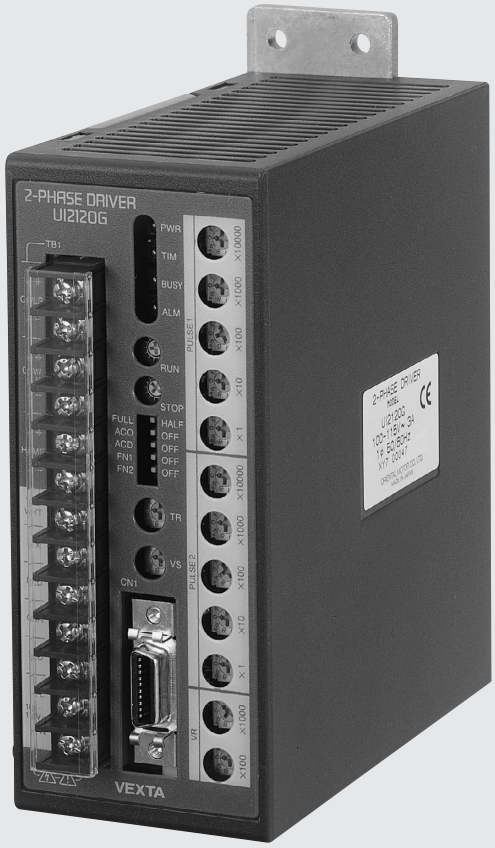


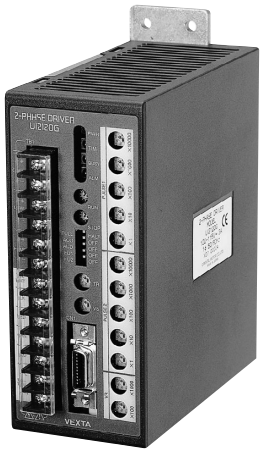
2-Phase Stepping Motor Driver with Built-in Indexer

UI2120G

Additional Information

2-Phase Stepping Motor Driver with Built-in Indexer

UI2120G



Model: **UI2120G**

The **UI2120G** Intelligent Stepping Motor Driver combines a high performance stepping motor driver with microprocessor intelligence and an integrated pulse generator. Motion control features include built-in digital switches to control the amount of travel, initial speed, running speed, acceleration, and deceleration.

Features

Minimal Wiring

A driver with an incorporated pulse generator offers simple wiring and easy setup.

Easy Operation

The **UI2120G** includes all functions necessary for controlling a 2-phase stepping motor. Motion control settings include: start, stop, rotation direction, travel amount, speed, acceleration, deceleration, step angle, and return to mechanical home. Data can be easily set by switches on the front control panel.

Compatible Motors

PK Series Standard Type

Motor Frame Size	Model		Basic Step Angle	Maximum Holding Torque		Current A/phase	Page
	Single Shaft	Double Shaft		oz-in	N·m		
1.65 in. 42 mm	**PK243-01AA**	**PK243-01BA**	1.8°	22	0.16	0.95	C-204
	PK244-01AA	**PK244-01BA**		36	0.26	1.2	
	PK245-01AA	**PK245-01BA**		45	0.32	1.2	
2.22 in. 56.4 mm	**PK264-02A**	**PK264-02B**		55	0.39	2	C-214
	PK264-02AR11 **PK264-02AR12**	—		55	0.39	2	C-233
	PK266-02A	**PK266-02B**		127	0.9	2	C-214
	PK266-02AR11 **PK266-02AR12**	—		127	0.9	2	C-233
	PK268-02A	**PK268-02B**		191	1.35	2	C-214
3.35 in. 85 mm	**PK296-01AA**	**PK296-01BA**		310	2.2	2	C-227
	PK299-01AA	**PK299-01BA**		620	4.4	2	
	PK2913-01AA	**PK2913-01BA**		930	6.6	2	

PK Series High Resolution Type

Motor Frame Size	Model		Basic Step Angle	Maximum Holding Torque		Current A/phase	Page
	Single Shaft	Double Shaft		oz-in	N·m		
1.65 in. 42 mm	**PK243M-01AA**	**PK243M-01BA**	0.9°	22	0.16	0.95	C-208
	PK244M-01AA	**PK244M-01BA**		36	0.26	1.2	
	PK245M-01AA	**PK245M-01BA**		45	0.32	1.2	
2.22 in. 56.4 mm	**PK264M-02A**	**PK264M-02B**		55	0.39	2	C-218
	PK264M-02AR11 **PK264M-02AR12**	—		55	0.39	2	C-236
	PK266M-02A	**PK266M-02B**		127	0.9	2	C-218
	PK266M-02AR11 **PK266M-02AR12**	—		127	0.9	2	C-236
	PK268M-02A	**PK268M-02B**		191	1.35	2	C-218

PK Series SH Geared Type

Motor Frame Size	Model		Basic Step Angle	Maximum Holding Torque		Current A/phase	Page
	Single Shaft	Double Shaft		lb-in	N·m		
1.65 in. 42 mm	**PK243A1A-SG3.6**	**PK243B1A-SG3.6**	0.5°	1.77	0.2	0.95	C-212
	PK243A1A-SG7.2	**PK243B1A-SG7.2**	0.25°	3.5	0.4		
	PK243A1A-SG9	**PK243B1A-SG9**	0.2°	4.4	0.5		
	PK243A1A-SG10	**PK243B1A-SG10**	0.18°	4.9	0.56		
	PK243A1A-SG18	**PK243B1A-SG18**	0.1°	7	0.8		
	PK243A1A-SG36	**PK243B1A-SG36**	0.05°	7	0.8		
2.36 in. 60 mm	**PK264A2A-SG3.6**	**PK264B2A-SG3.6**	0.5°	8.8	1	2	C-222
	PK264A2A-SG7.2	**PK264B2A-SG7.2**	0.25°	17.7	2		
	PK264A2A-SG9	**PK264B2A-SG9**	0.2°	22	2.5		
	PK264A2A-SG10	**PK264B2A-SG10**	0.18°	23	2.7		
	PK264A2A-SG18	**PK264B2A-SG18**	0.1°	26	3		
	PK264A2A-SG36	**PK264B2A-SG36**	0.05°	35	4		
3.54 in. 90 mm	**PK296A1A-SG3.6**	**PK296B1A-SG3.6**	0.5°	22	2.5	1.5	C-231
	PK296A1A-SG7.2	**PK296B1A-SG7.2**	0.25°	44	5		
	PK296A1A-SG9	**PK296B1A-SG9**	0.2°	55	6.3		
	PK296A1A-SG10	**PK296B1A-SG10**	0.18°	61	7		
	PK296A1A-SG18	**PK296B1A-SG18**	0.1°	79	9		
	PK296A1A-SG36	**PK296B1A-SG36**	0.05°	106	12		

Dimensions C-245 Connection and Operation C-246

Specifications

Model	**UI2120G**	
Power Source	Single-phase 100 V±15% 50/60 Hz 115 V±15% 60 Hz 3.0 A	
Drive Method	Unipolar constant current drive	
Output Current	2.0 A/phase or less	
Excitation Mode	Full Step (2 phase excitation): 1.8 degree/step Half step (1-2 phase excitation): 0.9 degree/step	
Operation Mode	Positioning Return to Electrical Home Operation Return to Mechanical Home Operation Continuous Operation JOG Operation	
Operating Pulse Speed Setting Range	50 Hz, and 100 Hz to 9900 Hz (100 Hz Units)	
Starting Pulse Speed Setting Range	50 Hz to 900 Hz (10 Hz Units)	
Acceleration/Deceleration Rate Setting Range	0 to 90 ms/kHz (10 ms/kHz Units)	
Move Distance Setting Range	0 to 99999 pulses (1 pulse Units), 2 Settings	
Max. Return Pulse Count	−16,777,215～+16,777,215	
Input Signals	Start Slowdown stop Emergency stop Rotation direction Index selection Operation mode Output current off signal	Photocoupler input Internal pull-up −10 VDC, 2.2 kΩ, Source current 4.5 mA TYP
	Limit sensor (CWLS, CCWLS and HOME)	Photocoupler input Input resistance 4.7k Ω, 24 VDC maximum, Input current 5 mA maximum
Output Signals	Excitation timing BUSY Alarm	Photocoupler, Open collector output (emitter common) External use condition 24 VDC maximum, 10 mA maximum
Functions	Step angle switch, Automatic current off, Automatic current cutback, Limit sensor input method switch, Rotation direction switch for return to mechanical home	
	Alarm output	Overheat detection, Limit sensor detection, Failure in return to mechanical home position
Indicators (LED)	Power input, Excitation timing output, BUSY output, Alarm output	
Cooling Method	Convection	
Weight	1.8 lb (0.8 kg)	
Insulation Resistance	100MΩ minimum under normal temperature and humidity, when measured by a 500 VDC megger between the following places: ● Power input terminal – ground terminal ● Motor output terminal – ground terminal ● Signal input / output terminals – power input terminal ● Signal input / output terminals – motor output terminal	
Dielectric Strength	Sufficient to withstand the following for one minute, under normal temperature and humidity: ● Power input terminal – ground terminal 1.5 kVAC 50 Hz ● Motor output terminal – ground terminal 1.5 kVAC 50 Hz ● Signal input / output terminals – power input terminal 3.0 kVAC 50 Hz ● Signal input / output terminals – motor output terminal 3.0 kVAC 50 Hz	
Ambient Temperature Range	32 °F～104°F (0°C～+40 °C) (nonfreezing)	

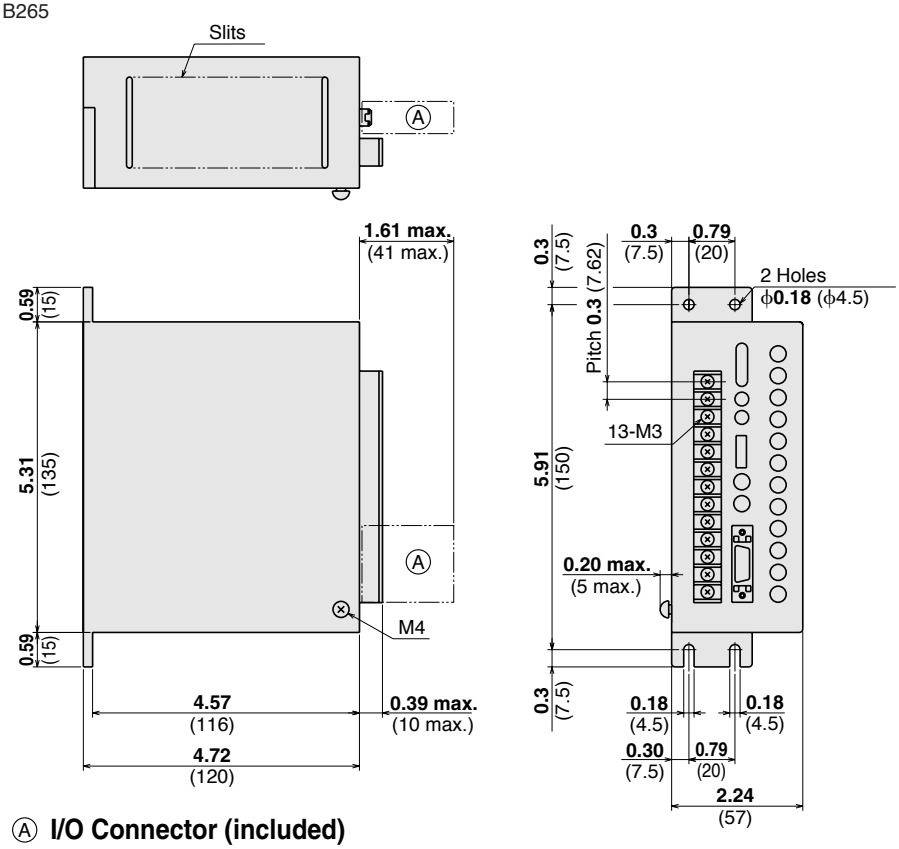
Notes:
- Power supply input current value is the maximum input current value of the driver. It differs according to the motor used, current setting and pulse rate.
- Do not test the insulation resistance or dielectric strength when the motor and driver are connected.

Dimensions Scale 1/4, Unit = **inch** (mm)

UI2120G

Weight: 1.8 lb. (0.8 kg)

DXF B265



Ⓐ **I/O Connector (included)**

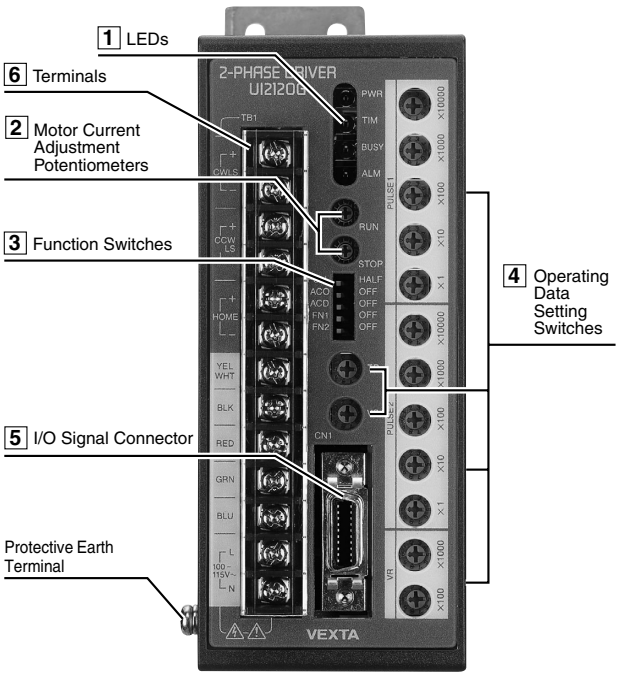
Connector: 54306-2011 (MOLEX)

Connector Cover: 54331-1201 (MOLEX)

Connection and Operation

Driver Functions

Driver Front Panel



1 Signal Monitor Display

LED Monitor Display

Indication	LED Name	Color	Condition when LED ON
PWR	Power input	Green	Lights during single phase 100 VAC±15% 50/60 Hz input 115 VAC±15% 60 Hz input
TIM	Excitation timing output	Green	Lights during excitation timing signal output.
BUSY	Busy output	Green	Lights during busy signal output.
ALM	Alarm output	Red	Lights or flashes during alarm signal output.

2 Motor Current Adjustment Potentiometers

Indication	Potentiometer Name	Factory Setting	Function
RUN	RUN	Min. Value	For adjusting current when the motor is operating.
STOP	STOP	Min. Value	For adjusting current reduced by automatic current cutback function at motor standstill.

3 Function Switches

Indication	Switch Name	Factory Setting	Function
FULL/HALF	Step angle	FULL	Selects full or half step.
ACO/OFF	Automatic current off	ACO	Turns off motor current automatically when the driver's internal temperature rises to 185 °F (+85 °C) or more.
ACD/OFF	Automatic current cutback	ACD	Reduces motor current automatically at motor standstill.
FN1/OFF	Limit sensor input method	FN1	Selects NO or NC-type sensor. NO sensor selected when set to FN1. NC sensor selected when set to OFF.
FN2/OFF	Rotation direction for return to mechanical home	FN2	Rotation starts in clockwise direction when set to FN2, and in counterclockwise direction when set to OFF.

4 Operating Data Setting Switch

Indication	Switch Name	Factory Setting	Function
PULSE1	Index #1 selector	All 0	Sets the number of motor steps. Five switches allow for settings from 0 to 99,999 steps.
PULSE2	Index #2 selector	All 0	Sets the number of motor steps. Five switches allow for settings from 0 to 99,999 steps.
VR	Operating pulse rate setting	All 0	Sets the output pulse rate of the built-in generator. Motor speed depends on the output pulse rate.
TR	Acceleration/deceleration rate setting	0	Sets the pulse acceleration and deceleration rates. The lower the switch setting, the higher the acceleration/deceleration rate. When the switch is set to 0, operation is performed without acceleration or deceleration.
VS	Starting pulse rate setting	0	Sets the first pulse rate when pulse generation starts. Motion starts at the VS set value and accelerates until VR is reached. Slowdown starts at the VR set value and decelerates to reach the VS set value.

5 I/O Signal Connector

Pin No.	Type	Signal	Description
1	Input Signals	Start signal	Starts operation in each mode.
2		Slowdown/stop	Slows the motor during positioning operation and stops it. In continuous operation mode, speed is reduced to VS and operation is continued at a constant speed. This is disabled in the return to mechanical home mode.
3		Emergency stop signal	Stops operation in any mode.
4		Rotation direction signal	Selects the rotation direction in each operation mode (except for return to mechanical home and return modes).
5		Travel index signal	Selects the index number in positioning mode.
6, 7, 8		Operation mode signal	Selects operation mode.
9		Output current off signal	Stops the supply of current to the motor. When this signal is input, the motor does not function even if a start signal is input.
10		GND	For input signals.
11	Output Signals	Excitation timing signal	Shows that the motor excitation sequence is at step 0; output when the motor excitation (winding where current flows) is in the initial state.
12		Busy signal	Output when the motor is running or the driver cannot accept the start signal.
13		Alarm signal	Output when the temperature within the driver has risen to 185 °F (+85 °C) or when the limit switch has tripped .
20		COM	For output signals.

Operation Mode Switching Signal

Operation Mode Switching Signal Input			Operation Mode
Pin No. 6	Pin No. 7	Pin No. 8	
OFF	OFF	OFF	Positioning
ON	OFF	OFF	Return to electrical home
OFF	ON	OFF	Return to mechanical home
ON	ON	OFF	Return to mechanical home based on timing signal synchronization
OFF	OFF	ON	Continuous
ON	OFF	ON	JOG

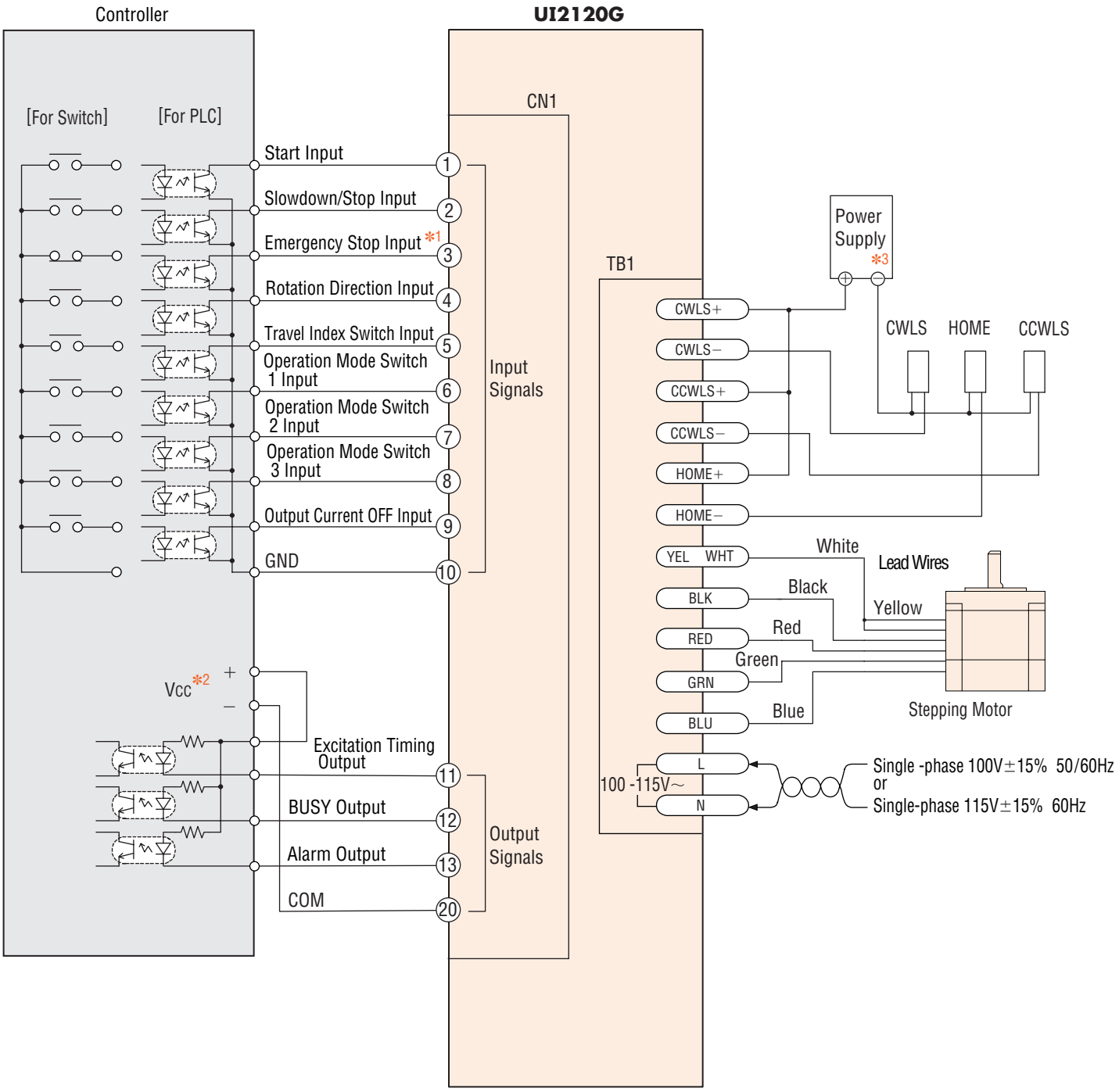
● Any combination not in the table above is ignored and operation is not performed even if the startup signal is input.

6 Terminals

Pin No.	Indication		Terminal Name	Connection
1	CWLS	+	CW limit sensor/ switch input	Limit sensor for the clockwise direction
2		−		
3	CCWLS	+	CCW limit sensor/ switch input	Limit sensor for the counterclockwise direction
4		−		
5	HOME	+	Home position sensor input	Mechanical home position sensor
6		−		
7	YEL / WHT		Yellow/white motor lead connection	Yellow/white motor lead wire
8	BLK		Black motor lead connection	Black motor lead wire
9	RED		Red motor lead connection	Red motor lead wire
10	GRN		Green motor lead connection	Green motor lead wire
11	BLU		Blue motor lead connection	Blue motor lead wire
12	100-115 VAC	L	Power connection	Single-phase 100 VAC±15% 50/60 Hz 115 VAC±15% 60 Hz
13		N		

Dimensions C-245
Connection and Operation C-246

Connection Diagrams

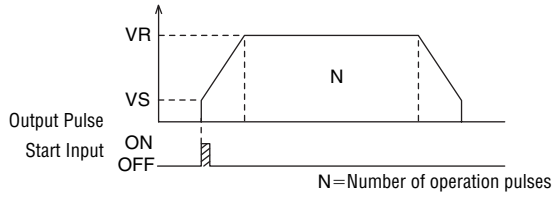


*1 Always use the emergency stop input in the ON (Normally Closed) state.
*2 The voltage of Vcc should not be over 24 VDC and 10 mA.
*3 24 VDC or less, input current 5 mA or less.

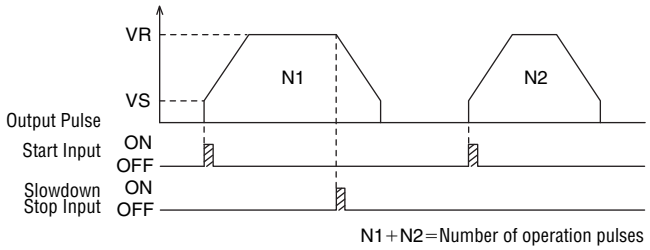
Operation Modes

Positioning Mode

This is the mode where the distance traveled is performed automatically based on the number of operation pulses set on the travel setting switch (PULSE 1 or PULSE 2), and is stopped after that. Operation is performed at the speed set on the **VR** switch.

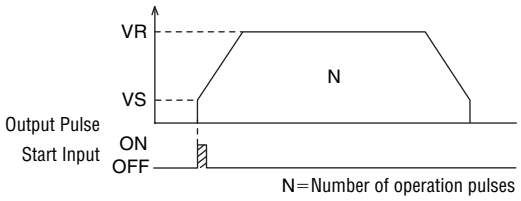


If slowdown/stop signals are input during positioning operation, the motor will stop after slowdown. If you input the start signal again, the motor rotates the remaining number of the set pulses for operation.

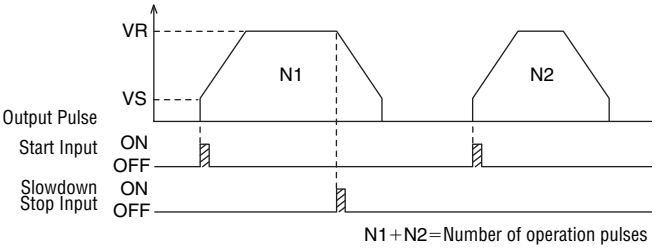


Return Operation Mode

In this mode, the amount of travel is calculated between the current position and the start point (electrical home position) where positioning is started, and the motor return automatically to the start point.
(Automatic calculation is possible when the total travel is within ±16777215 pulses. If this range is exceeded, you cannot go back to the start position.)
When the emergency stop is input, that position becomes the new start point.



When the slowdown/stop signal is input during the return operation, the motor stops after slowdown. If a start signal is input, the motor restarts the return operation to move to the electrical home position.

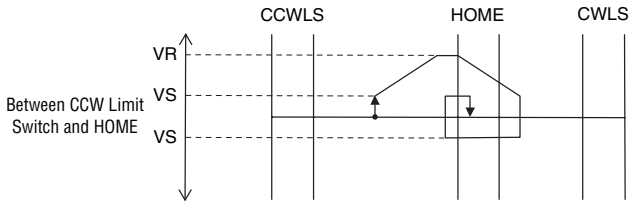


Return to Mechanical Home Operation Mode

The mechanical home position refers to the reference position of the equipment set by the home sensor. This is the operation mode where the CW and CCW limit sensors mounted on the equipment are used to perform rotation automatically to reach the home position (mechanical home position) where rotation stops. Return to the home position is possible from any position according to a specified sequence while checking the current positions by three sensors. You can change the direction of starting the operation using the selector switch (FN2/OFF).
Operation example: The startup point is between the CCWLS and HOME
(When the switch to select the rotation direction in return to mechanical home position is FN2)

① Operation is started in the clockwise direction by the input of a start signal.
② When the home position has been detected, operation starts at the VS in the reverse direction after a slowdown and stop.
③ When the home position is detected again and is turned off, operation starts at the VS in the reverse direction.
④ When HOME is input, the motor stops.

Home position detection operation startup direction: CW



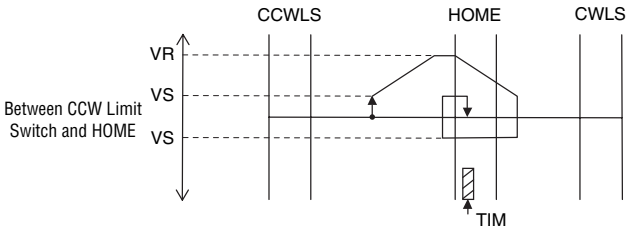
Notes:
- Return to mechanical home operation varies according to the motor position when start signal is input.
- After return to mechanical home operation, the mechanical home position will become the electrical home position.

Return to Mechanical Home Operation Based on Timing Signal Synchronization

For return to mechanical home operations using only the home position sensor, the home position may deviate or vary due to the home position sensor error or installation error. In this case, you can maintain accuracy by AND-ing the timing signal produced by the driver and the signal of home position sensor. Use of the timing synchronization function allows the home position detecting accuracy to be kept within ±1 pulse of the motor.
Return to mechanical home operation based on timing signal synchronization is the return to mechanical home operation AND-ed automatically with timing signal inside the driver. The operation is the same as that of normal return to mechanical home operation.

- The home sensor position must be adjusted to the position where the driver timing signal is generated.

Home position detection operation startup direction: CW



Note:
Return to mechanical home operation based on timing signal synchronization varies according to the motor position when start signal is input.

◆ Jog Operation Mode

This is a pulse-by-pulse operation mode convenient for fine positioning of the stepping motor shaft. When the startup signal is input, the motor moves only one step. If startup signal input is continued for one second or more in the jog operation mode, continuous operation will be started at 30 Hz and the motor is stopped when the start signal input is stopped.

◆ Continuous Operation Mode

In this mode, operation is continued until the emergency stop signal is input.
If the slowdown/stop signal is input during the operation, the speed is reduced to the startup pulse speed (VS); then rotation is carried out at a constant speed until the emergency stop is input.