

3 Driver Unit Model EDD

3.1 Features

- **Achieves settling time of 1 ms with a unique servo algorithm.**
The Driver Unit Model EDD adopts an original disturbance observer and preview-based feed-forward control, which significantly reduces positioning time, especially settling time (approach time).
- **Positioning controller function**
Positioning can be controlled without complicated communication or an upper controller.
- **Variety of control I/Os**
Offers various positioning input/output controls, including an encoder output, servo control, and program control. No additional sensors are needed for status monitoring.

3.2 Components and Functions

Rear mounting hole
Optional mounting bracket available for front mounting.

Independent inputs for main power and control power
Separate power lines assure system safety.

Motor cable connector
Makes it quicker to setup electric components and prevents incorrect wiring.

7 segment LED indicators
Driver Unit status can be recognized at a glance.

Analog monitor output terminal
Speed, positioning error, torque, motor current, etc. can be monitored by analog voltage. Effective for making adjustments and monitoring operating status.

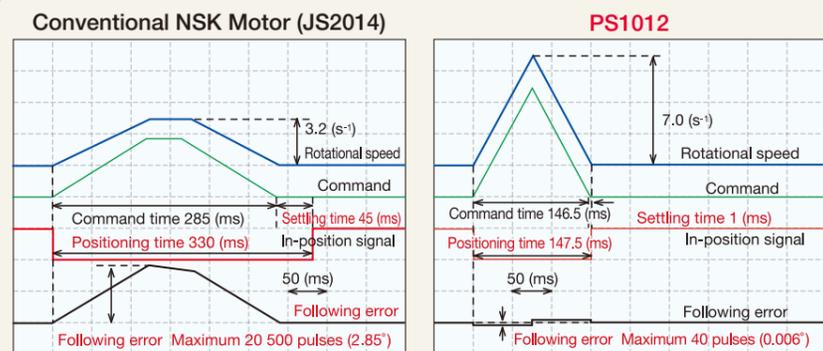
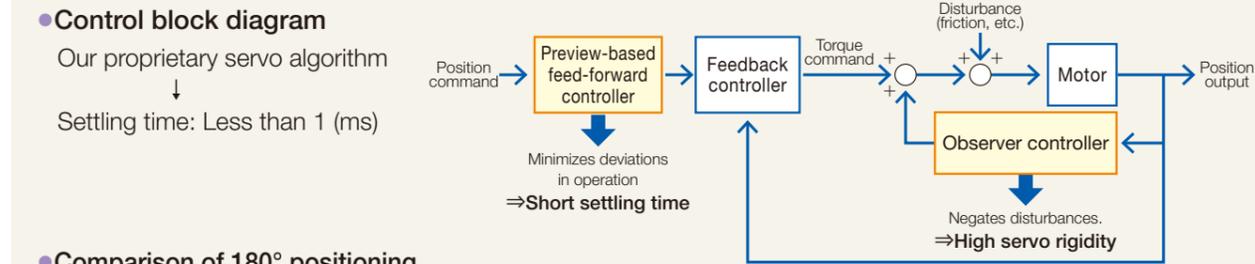
RS-232C communication port
Can connect with the Handy Terminal to set parameters.
*This port cannot be used with the EDD Megaterm software. Please use the USB port instead.

USB port
Provides a PC connection with EDD Megaterm software (free download from NSK's website).

Control I/O port
A variety of signals are available, including servo on, in-position, emergency stop, area signal, override, various alarm outputs, $\phi A/\phi B/\phi Z$, etc.

3.3 Control Technology

Control Technology and Example High-Speed Positioning



Settling time	45 (ms)	⇒	1 (ms)
Following error	20 500 pulses	⇒	40 pulses
Positioning time	330 (ms)	⇒	147.5 (ms)

3.4 Designation

Example Designation: **M-EDD - PS1006 A B 5 01 -03**

- M-EDD**: Driver Unit Model EDD
- PS1006**: Motor size code
- A**: Power voltage A: 100 to 240 (VAC) (single-phase) (PN4, PNZ4 models: 200 to 240 (VAC) only)
- B**: Position sensor code B: Absolute position sensor code
- 5**: Function 5: Standard
- 01**: Design serial number 01: Standard
- 03**: Connectors, Fixing brackets and startup Guide are included

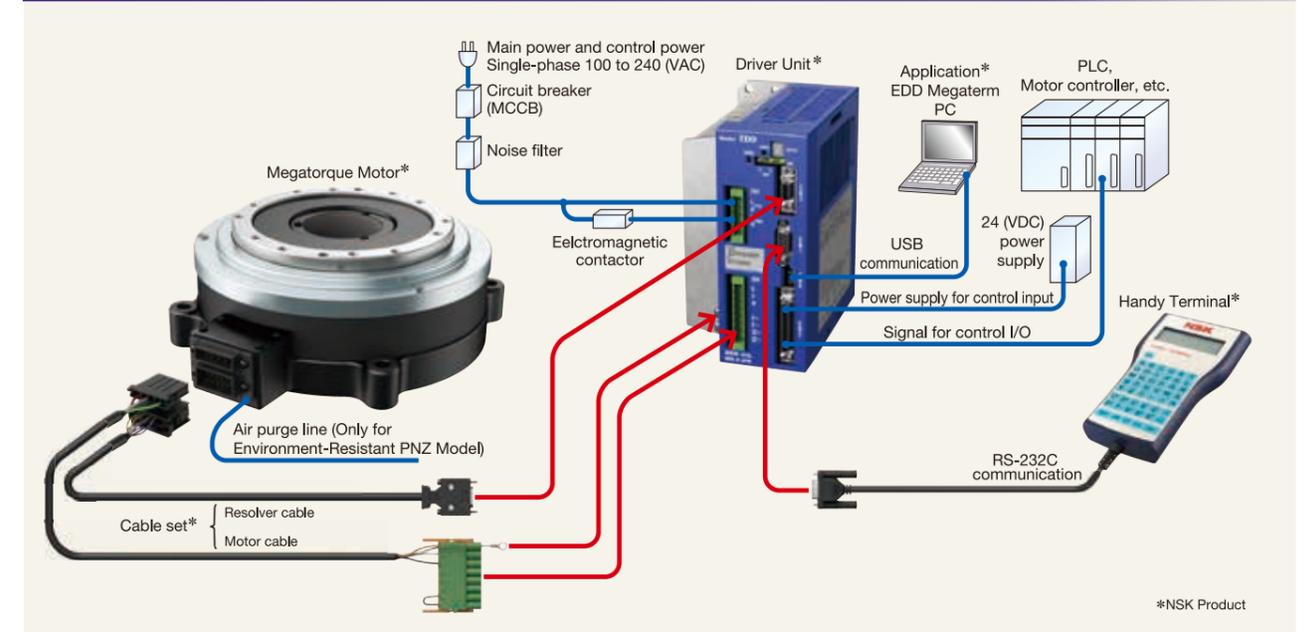
Environment-Resistant PNZ Model, PN Model With Brake, and PN Model use the same Driver Units. Refer to Section 9 "Motor and Driver Unit Combination" for more details on applicable models.

Standard accessories

- (1) CN2 connector (user side) Plug: DF02P050F22A1(JAE) Hood: DF02D050C21 (JAE), or equivalent
- (2) CN5 connector (user side) Connector: FKC2, 5/5-ST-5, 08-LR (Phoenix Contact), or equivalent
- (3) Driver unit fixing brackets
- (4) Startup Guide

3.5 System Configuration

System Configuration of PS/PN Model, Environment-Resistant PNZ Model



*For PN Model With Brake, refer to 3.9 Example of system configuration of PN Model With Brake.

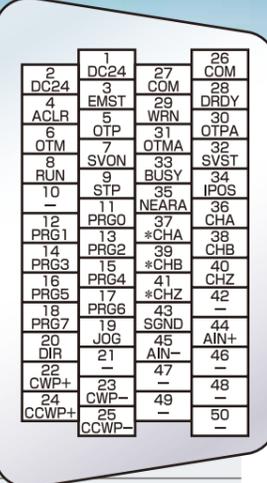


3.6 General Specifications

Item	Motor model	PS1006	PS1012	PS1018	PS3015	PS3030	PS3060	PS3090	PN2012	PN3045	PN4135	PN4180
Input power	Rated capacity (kVA)	0.3	0.4	0.6	0.6	0.9	0.5	0.6	0.2	0.5	0.8	1.0
	Maximum capacity (AC200V) (kVA)	1.0	1.4	2.2	2.2	2.7	4.6	4.7	2.3	4.1	4.8	4.8
	Maximum capacity (AC100V) (kVA)	0.4	0.6	0.9	1.0	1.2	2.0	2.2	0.8	1.9	-	-
	Control capacity (kVA)	0.06										
	Control power source	Single phase 100 to 240 VAC 50 to 60 Hz										Single phase 200 to 240 VAC 50 to 60 Hz
	Main power	Voltage fluctuation +10/-15% or less										Voltage fluctuation +10/-15% or less
Resolution of position sensor count/turn		2 621 440										
Control mode	Positional control	Program operation (up to 256 Program channels: Position commands and parameter settings are programmable), Pulse train command, RS-232C serial communication command, Jogging, Home Return										
	Speed control	RS-232C serial communication command, analog input										
	Torque control	RS-232C serial communication command, analog input										
Input signal	Pulse train command	Photocoupler input Maximum frequency: 2 (MHz) Input format: CW/CCW, Pulse and direction or $\phi A/\phi B$ Resolution changer for universal multiplication is available (1 000 to 5 242 880 count/turn)										
	Analog input	Analog command voltage input Input voltage: ± 10 (V)										
	Control input	Photocoupler input (\pm common), 17 input ports (Input voltage: 24 (VDC))										
Output signal	Position feedback signal	Signal format: $\phi A/\phi B/\phi Z$ line driver. Universal resolution setting to $\phi A/\phi B$ is available. Resolution of $\phi A/\phi B$: Shipping set: 20 480 (count/revolution) (Quadrupled: 81 920) Maximum: 1 310 720 (count/revolution) (Quadrupled: 5 242 880) *As the maximum frequency is 781 kHz, the resolution setting limits the maximum velocity. Maximum rotational speed (s ⁻¹)=781 (kHz)/ Resolution of $\phi A/\phi B$ Resolution of ϕZ : 80 (count/revolution)										
	Control output	Photocoupler output (\pm common), 8 outputs (Max. switching capacity: 24 (VDC) / 50 (mA))										
Alarms	Excess position error, Program error, Automatic tuning error, Position command/feedback error, Software thermal error, Home position undefined, Main AC Line under voltage, Travel limit over, RAM error, ROM error, System error, Interface error, ADC error, Emergency stop, CPU error, Position sensor error, Absolute position error, Motor cable disconnect, Excessive velocity, Commutation error, Overheat, Main AC Line over voltage, Excess current, Control AC line under voltage, Power module alarm											
Monitors	Analog monitor x 2, (Free range and offset setting), RS-232C monitor, USB monitor											
Communication	RS-232C serial communication (asynchronous, 9 600 (bps)), USB (USB 2.0 compatible)											
Others	Automatic tuning Function set to Input/output ports available Cam curve drive (Deformation sine, Modified trapezoidal, Cycloid, Harmonic motion)											
Environmental conditions	Operating/Storing temperatures	0 - 50 (°C) / -20 - +70 (°C)										
	Operating/Storing humidity	90% or less with no moisture										
	Vibration resistance	4.9 (m/s ²) or less										
Internal functions	Regenerative energy absorption	Optional regenerative resistor										
	Dynamic brake	Functions at power off, servo off, and in the occurrence of an alarm.										
Compatible safety regulation	UL	UL61800-5-1										
	CE	LVD	EN61800-5-1									
Connector	USB	CN0	USB mini-B									
	RS-232C	CN1	D-sub 9 pin									
	Control I/O	CN2	Half-pitch connector 50 pins									
	Position sensor	CN3	Half-pitch connector 14 pins									
	Motor	CN4	Plastic connector									
	Optional regenerative resistor											
Main/control power source	CN5	Plastic connector										

3.7 Signal Specifications for CN2 (Control I/O)

Input/Output	Signal Code	Pin No.	Signal Name	Function
Input Signal	DC24	1,2	24 (VDC) external power supply	External power supply for input signal
	EMST	3	Emergency stop	Terminates positioning operation and the Motor stops by the dynamic brake*1
	ACLR	4	Alarm clear	Clears warning*1
	OTP	5	Over travel limit (+ direction)	If OTP goes active, the Motor servo is locked in the CW direction*1
	OTM	6	Over travel limit (- direction)	If OTM goes active, the Motor servo is locked in the CCW direction*1
	SVON	7	Servo on	If SVON goes active, the servo turns on and the system waits for a command to be entered*1
	RUN	8	Start program	Starts program operation specified by the PRG input*1
	STP	9	Stop	Stops positioning operation and execution of the program*1
	-	10	(Do not connect)	-
	PRG0	11	Internal program channel selection 0	For a program positioning operation: A combination of ON and OFF PRG0 to PRG7 inputs specified channel (0 to 255) to be executed*1
	PRG1	12	Internal program channel selection 1	
	PRG2	13	Internal program channel selection 2	
	PRG3	14	Internal program channel selection 3	
	PRG4	15	Internal program channel selection 4	
	PRG5	16	Internal program channel selection 5	
	PRG6	17	Internal program channel selection 6	
	PRG7	18	Internal program channel selection 7	
	JOG	19	Jogging	If JOG goes active, the Motor rotates. If it goes inactive, the Motor decelerates and stops*1
	DIR	20	Jogging direction	Specifies the direction of jogging*1
	-	21	(Do not connect)	-
	CWP+	22	CW pulse train (-)	Pulse train command rotates the Motor in the CW direction (Direction or Phase B)
	CWP-	23	CW pulse train (-)	
	CCWP+	24	CCW pulse train (+)	Pulse train command rotates the Motor in the CCW direction (Pulse or Phase A)
	CCWP-	25	CCW pulse train (-)	
	Output signal	COM	26,27	Output signal common
DRDY		28	Driver Unit ready	Reports that the Motor is ready to rotate (The port opens when the Motor is not ready, or an alarm occurs)
WRN		29	Warning	Warns of abnormality in the System*2
OTPA		30	Over travel limit (+ direction) detected	Reports the output of over travel limit (software and hardware) in the plus direction*2
OTMA		31	Over travel limit (- direction) detected	Reports the output of over travel limit (software and hardware) in the minus direction*2
SVST		32	Servo state	Reports the state of the servo*2
BUSY		33	In-operation	Reports state of positioning operation*2
IPOS		34	In-position	Reports the condition of positioning error and the positioning operation*2
NEARA		35	Target proximity A	Reports that the Motor is approaching destination*2
CHA		36	Positioning feedback signal ϕA	A pulse signal that reports the number of motor rotations Output format is line driver
*CHA		37	Positioning feedback signal * ϕA	
CHB		38	Positioning feedback signal ϕB	
*CHB		39	Positioning feedback signal * ϕB	
CHZ		40	Positioning feedback signal ϕZ	
*CHZ		41	Positioning feedback signal * ϕZ	
-	42	(Do not connect)	-	
SGND	43	Signal ground	Ground for the position feedback signal	
Input signal	AIN+	44	Analog signal	± 10 (VDC) Analog input signal
	AIN-	45	Ground for analog signal	
	-	46-50	(Do not connect.)	



Carefully follow these instructions when wiring to the Control I/O (CN2):

- Use shielded wires and a twisted pair for pulse train input and position feedback output. These wires should be as short as possible (up to 2 m).
- Selection and optional settings to control Input/Output signal functions
- You may reassign functions to control Input/Output by setting parameters.

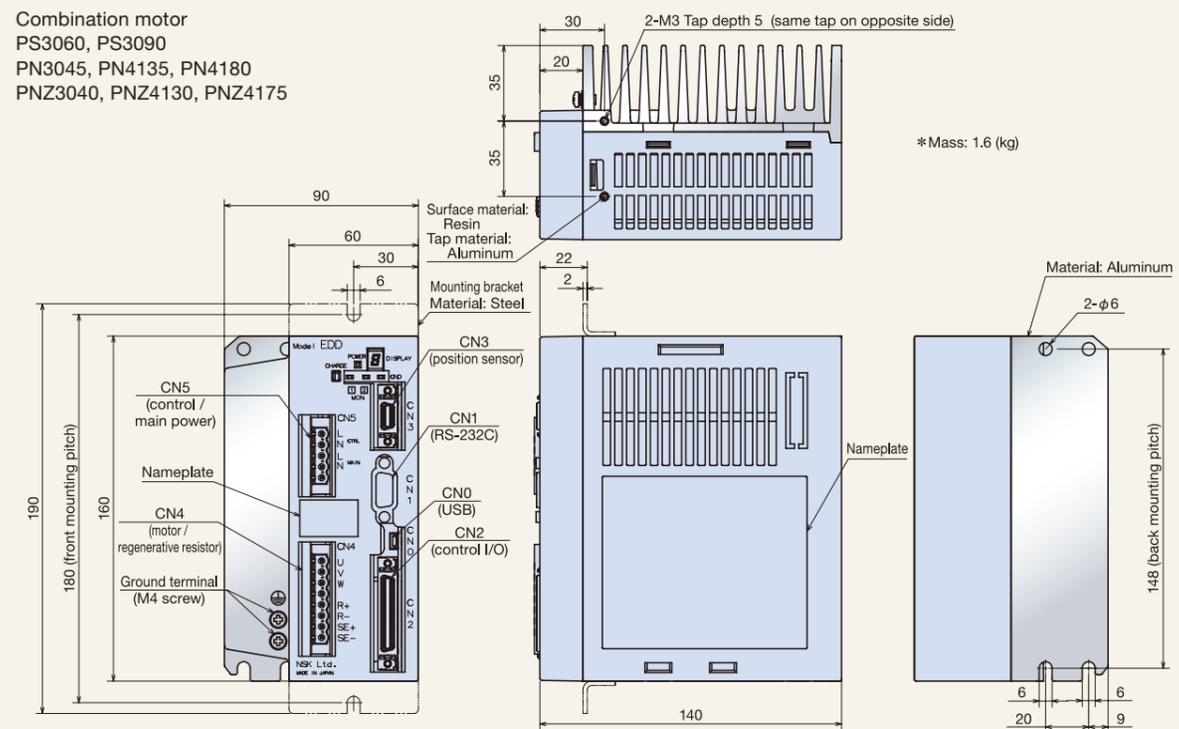
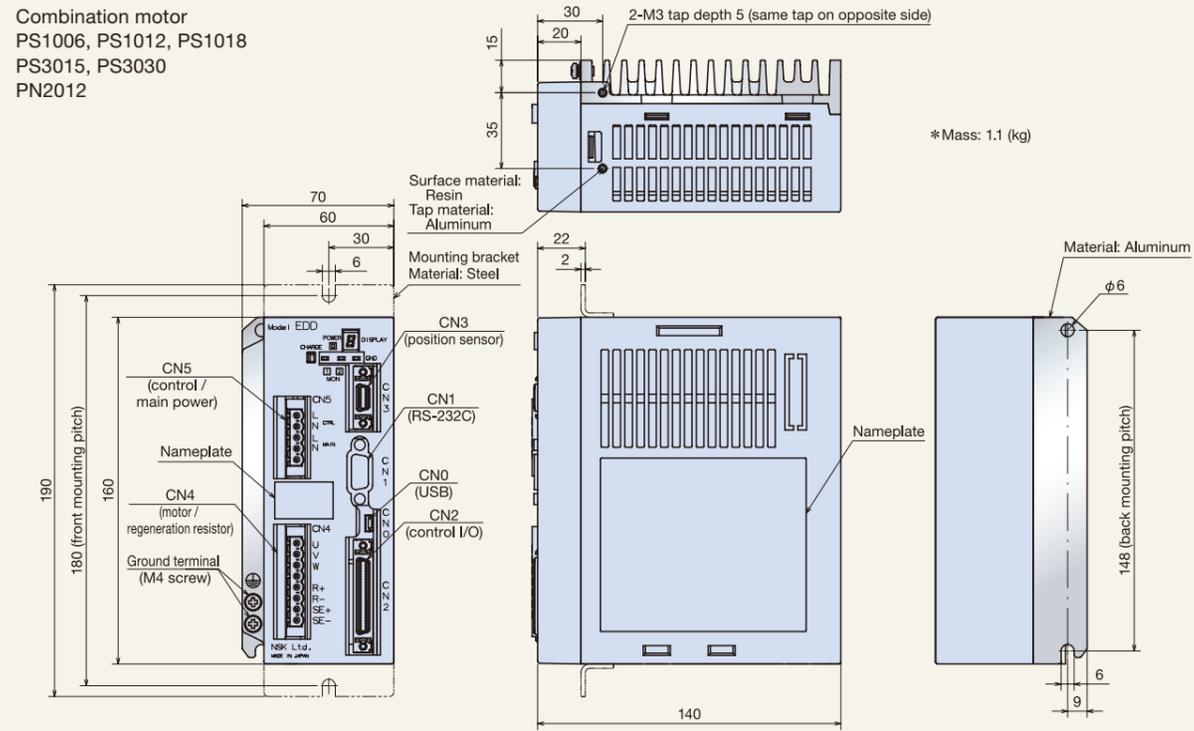
*1 Input signal: Select up to 16 input signals out of the 22 input signals listed above and then set them to Pins 4 to 9 and 11 to 20. (In addition to the Input signals listed above, you may select: Hold, Velocity override, Integration OFF, Home return start, and/or Home position limit.)

- Pin No. 3 is fixed to the "Emergency stop" signal. The signal polarity is variable.

*2 Output signal: Select up to 7 output signals out of the 23 output signals listed above and then assign them to Pins 29 to 35. In addition to the Output signals listed above, you may select: Target proximity B, Zone A/B/C, Over travel limit (\pm direction), Normal, Position error (under/over), Velocity (under/over), Torque command (under/over), Thermal loading (under/over), Home return completed, and/or Home position defined.

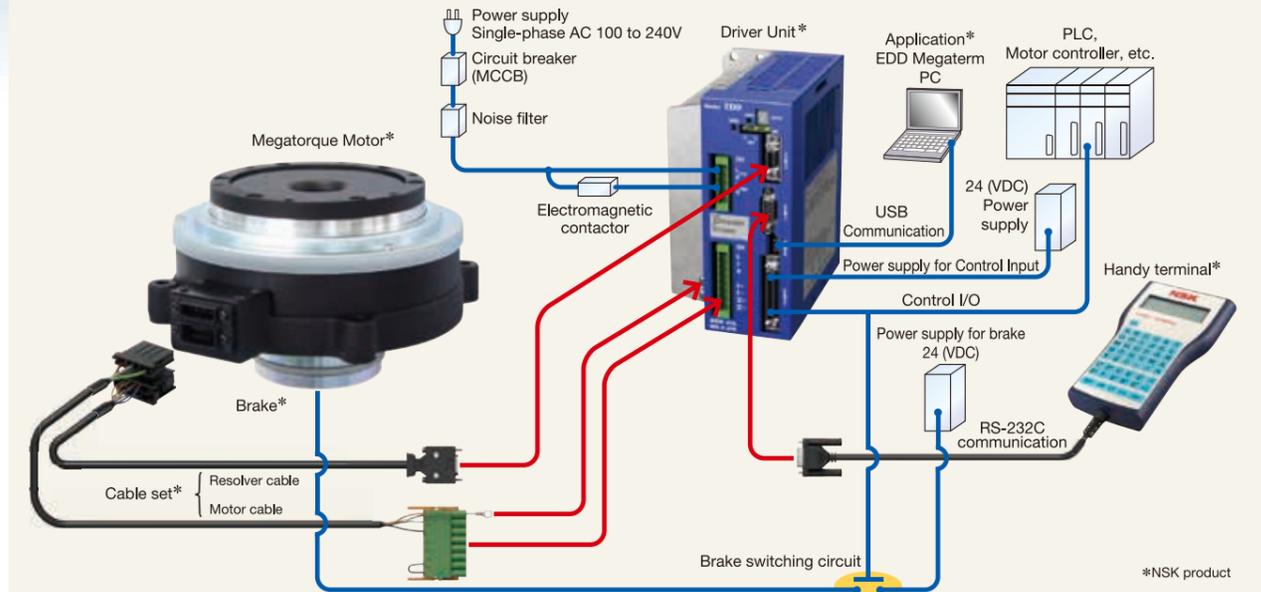
- The output "Driver Unit ready" set to Pin 28 can only be replaced with output signal "Normal." (Signal polarity cannot be changed.)

3.8 Dimensions (Standard Specifications)

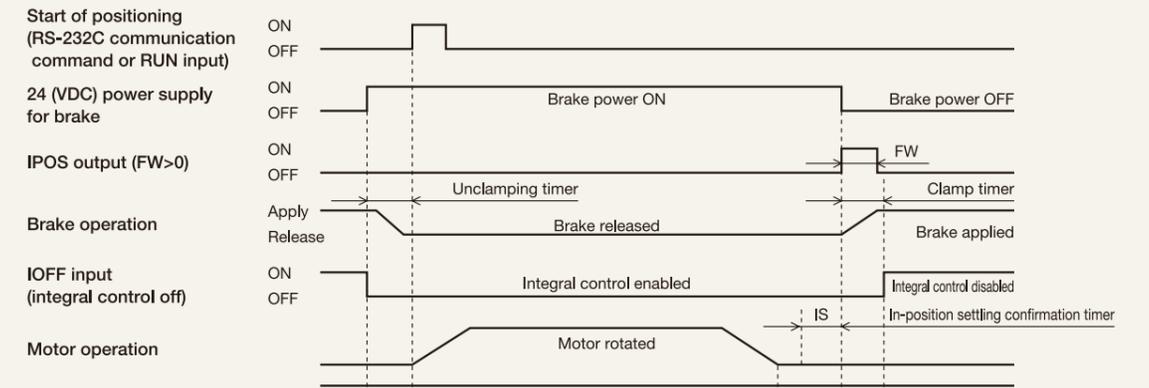


3.9 Example System Configuration

System Configuration of PN Model With Brake



Example Break Sequence



For brake sequence details, refer to the User's Manual.