



MOTION & CONTROL™  
**NSK**

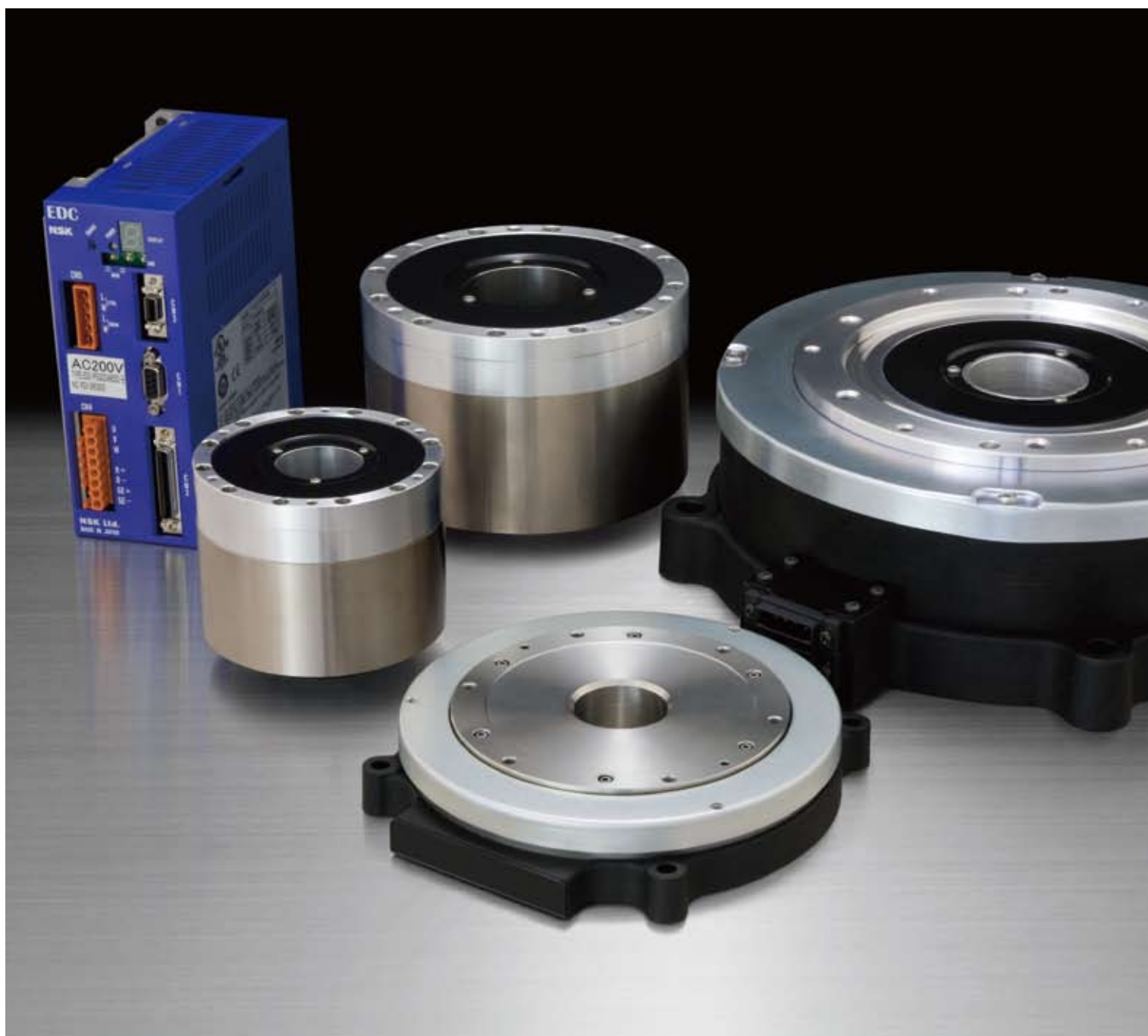
# MEGATORQUE MOTOR™

## PS Series / PN Series

### UL Standard and CE Marking Conformed



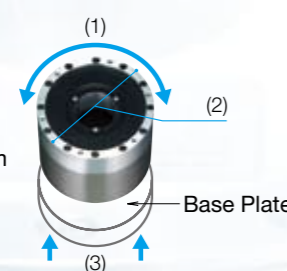
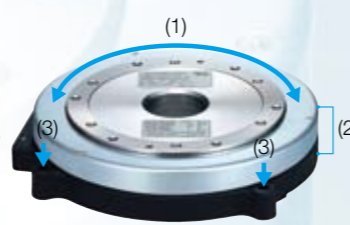
Diverse selection of high performance motors with full consideration for safety and the environment



# The Megatorque Motor draws upon NSK's combined strengths in manufacturing bearings, sensors and motors.

The NSK Megatorque Motor's reliability effectively demonstrates NSK's full manufacturing and design capabilities. Complete aftercare support is available through our many offices worldwide. The Megatorque Motor boosts productivity and achieves high performance in full compliance with the latest safety standards.

Comparison of major features

PS Series	PN Series
Outer rotor	Inner rotor
Small diameter	Low profile
Fixed from the bottom	Fixed from the top
High rotational speed	High rigidity
Small installation space	Low motor height
Compact, clean, high accuracy, hollow structure, maintenance free	
For high-speed positioning of medium/light loads	For positioning of heavy loads
 <p>(1) Outer rotor (2) Small diameter (3) Fixed from the bottom</p>	 <p>(1) Inner rotor (2) Low profile (3) Fixed from the top</p>





# A direct-drive motor with advanced features only available from NSK

With advanced features, including high torque, high resolution, maximum rotational speed of 10 [s<sup>-1</sup>] (PS Series), high rigidity and compactness, the Megatorque Motor complies with CE mark, UL standards, and the EU RoHS directive. These innovative direct-drive motors are extremely accurate, light-weight, and boost the productivity of various devices.

## High resolution

The Megatorque Motor's absolute position sensor is capable of a high resolution of 2 621 440 [counts/rev] and repeatability of ±2 [arc seconds]. It requires no homing operations and facilitates the development of highly accurate devices.

Resolution of position sensor

**2 621 440**  
[counts/rev]

## Shortened positioning time

A new servo algorithm shortens settling time to less than one-fifth of conventional NSK motors. Shortened positioning time boosts the productivity of various devices.

Settling time

Less than **1/5**

## High torque

The optimal magnetic field design gives it more than twice as much force density as conventional NSK motors. A maximum of 50% increase in motor torque increases productivity during high acceleration/deceleration drives.

Force density

More than **twice** as much

## Compact motor

NSK's advanced design technology has produced two unique motor series: the low profile PN Series (height of PN2: 35 [mm]) and the light and compact PS Series (external diameter of PS1: ø100 [mm]).

Height

**35** [mm]  
(PN2)

Outer diameter

**ø100** [mm]  
(PS1)

Resolution of position sensor **2.62** million [counts/rev]

PS Series Maximum rotational speed **10** [s<sup>-1</sup>] (varies by motor model)

## High accuracy and interchangeability

Interchangeable Motors and Driver Units can be randomly matched. Increased positioning accuracy of 90 [arc seconds] and interchangeability improve ease of use.

Absolute positioning accuracy

**90** [arc seconds]

## Intelligent

The EDC Driver Unit's positioning controller function is provided as a standard feature. In addition, an electronic gear function is built in for setting the pulse train position command. The EDC Megaterm software is used to collect, edit, and monitor data.

Positioning controller function is a standard feature

## Full consideration for people and the environment

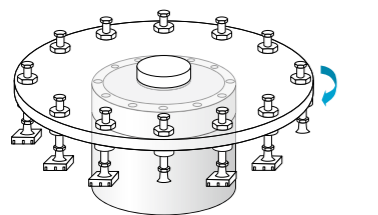
Compliance with international safety standards (UL Standards, CE mark) assures worldwide applicability. The Megatorque Motor is environment friendly and complies with the EU RoHS Directive.

Compliant with UL Standards, CE mark, EU RoHS Directive



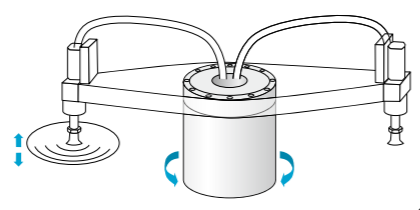
## PS and PN Series in a variety of applications and installations

Application 1: **PS Series**  
Inspection equipment for electronic parts



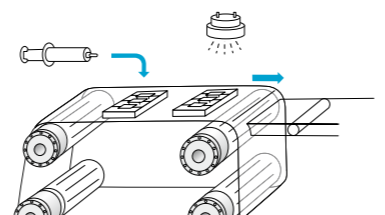
- High speed and high accuracy
- Compact
- Clean
- Hollow structure (convenient for wiring/tubing)

Application 2: **PS Series**  
Transport for DVD/CD



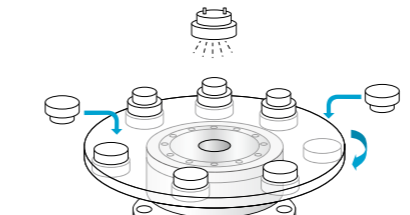
- High speed and high accuracy
- Clean
- Maintenance free
- Hollow structure (convenient for wiring/tubing)

Application 3: **PS Series**  
Inspection conveyor for medical devices



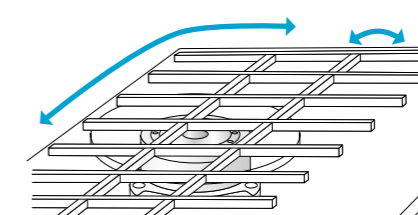
- Compact
- Clean
- Maintenance free

Application 4: **PN Series**  
Automatic part assembly



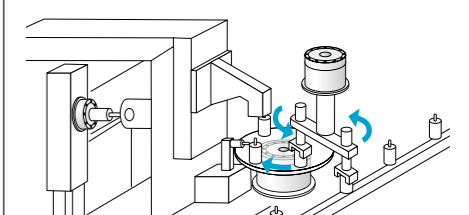
- High speed and high accuracy
- Compact
- Advanced functions (unequal partitioned positioning and short-cut positioning)

Application 5: **PN Series**  
Turn table and alignment for flat panels



- Compact
- Maintenance free
- Advanced functions (fine positioning)
- High torque

Application 6: **PN Series + PS Series**  
Manufacturing line for electric parts



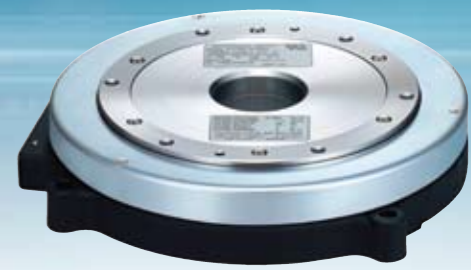
- High-speed
- Compact
- Maintenance free

# 1 Selection Guide

## PS Series (Outer Rotor Type)



## PN Series (Inner Rotor Type)



Series	PS Series			
Model	PS1 Model Motor		PS3 Model Motor	
Maximum output torque [N·m] Motor height [mm]				
Motor outer diameter [mm]	φ100		φ150	
Motor hollow diameter [mm]	φ35		φ56	
Maximum rotational speed [s <sup>-1</sup> ]	10	10	8	5
Resolution of position sensor [counts/rev]	2 621 440			
Absolute positioning accuracy [arc sec]	90 (interchangeable type, ambient temperature: 25 ± 5 [°C])			
Driver unit model (Dimensions: W × D × H [mm])	EDC Driver Unit  70 × 140 × 190		EDC Driver Unit  90 × 140 × 190	
Reference page	13			
Features	Shortened positioning time Compact motor Interchangeable, highly accurate absolute position sensor Compact driver unit			

Series	PN Series		
Model	PN2 Model Motor	PN3 Model Motor	PN4 Model Motor
Maximum output torque [N·m] Motor height [mm]			
Motor outer diameter [mm]	φ170	φ210	φ280
Motor hollow diameter [mm]	φ36	φ56	φ50
Maximum rotational speed [s <sup>-1</sup> ]	2	3	3
Resolution of position sensor [counts/rev]	2 621 440		
Absolute positioning accuracy [arc sec]	90 (interchangeable type, ambient temperature: 25 ± 5 [°C])		
Driver unit model (Dimensions: W × D × H [mm])	EDC Driver Unit  70 × 140 × 190		EDC Driver Unit  90 × 140 × 190
Reference page	13		
Features	Shortened positioning time Low profile and high rigidity motor Interchangeable, highly accurate absolute position sensor Compact driver unit		



# 2 Motor Specifications

## 2.1 PS Series Motor

### 2.1.1 Coding for PS1 Model Motor Reference Number

Example of Reference Number: **M-PS 1 006 KN 002**

- M-PS**: Megatorque Motor PS Series
- 1**: Motor size code
- 006**: Maximum output torque [N·m]
- KN**: Standard
- 002**: Design serial number (002: Standard, 003: High-precision products (made to order)\*1)



### 2.1.2 PS1 Model Motor Specifications

Functional item	Reference number	M-PS1006KN002	M-PS1012KN002	M-PS1018KN002
Motor outer diameter [mm]			∅100	
Maximum output torque [N·m]		6	12	18
Rated output torque [N·m]		2	4	6
Motor height [mm]		85	110	135
Motor hollow diameter [mm]			∅35	
Maximum rotational speed [s <sup>-1</sup> ]			10	
Rated rotational speed [s <sup>-1</sup> ]			5	
Resolution of position sensor [counts/rev]			2 621 440	
Absolute positioning accuracy [arc sec]*1		90 (interchangeable type, ambient temperature: 25 ± 5 [°C])		
Repeatability [arc sec]		±2		
Allowable axial load [N]		1 000 (under no radial load)		
Allowable radial load [N]		820 (under no axial load)		
Allowable moment load [N·m]		28		
Rotor's moment of inertia [kg·m <sup>2</sup> ]		0.0024	0.0031	0.0038
Recommended load's moment of inertia [kg·m <sup>2</sup> ]		0.015–0.24	0.03–0.31	0.03–0.38
Mass [kg]		2.4	3.5	4.5
Environmental conditions		Ambient temperature 0–40 [°C]; humidity: 20–80 [%]; use indoors, free from dust, condensation and corrosive gas. IP30 equivalent.		

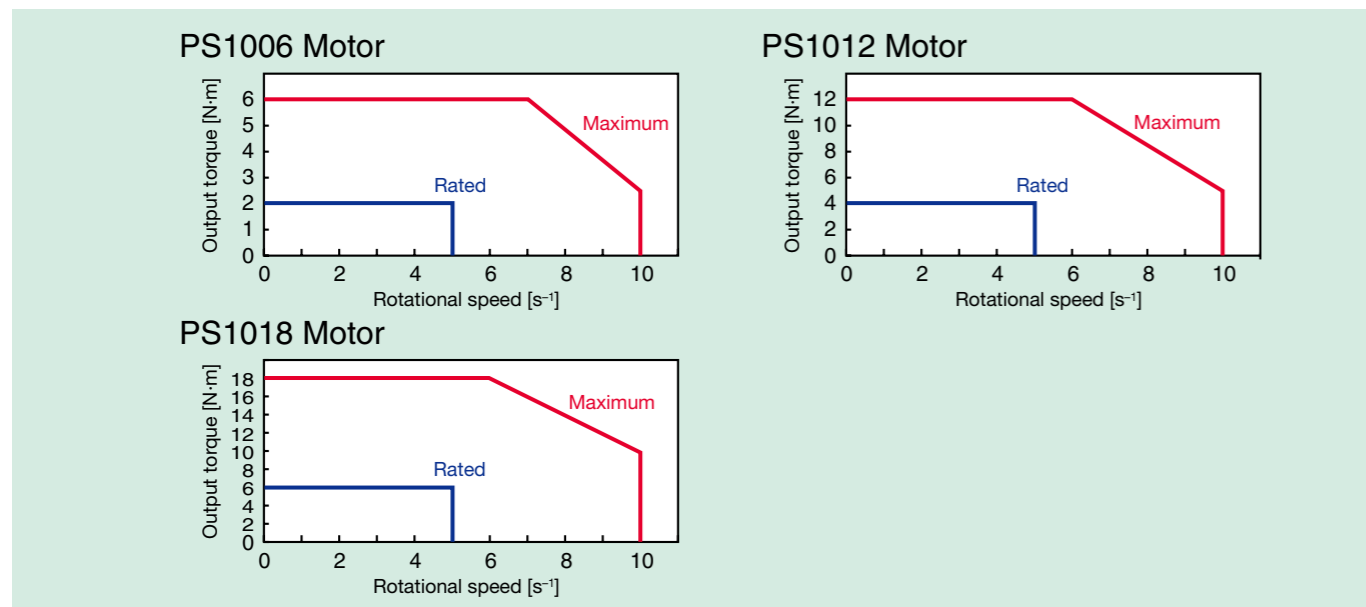
Note: Please consult with NSK in case of a simultaneous application of axial load, radial load and moment load to a Motor.

For an oscillating operation less than 45 [°], turn the Motor 90 [°] or more at least once a day.

\*1 Absolute positioning accuracy of high-precision products (made to order) is 30 [arc sec]. (interchangeable type, ambient temperature of 25 ± 5 [°C])

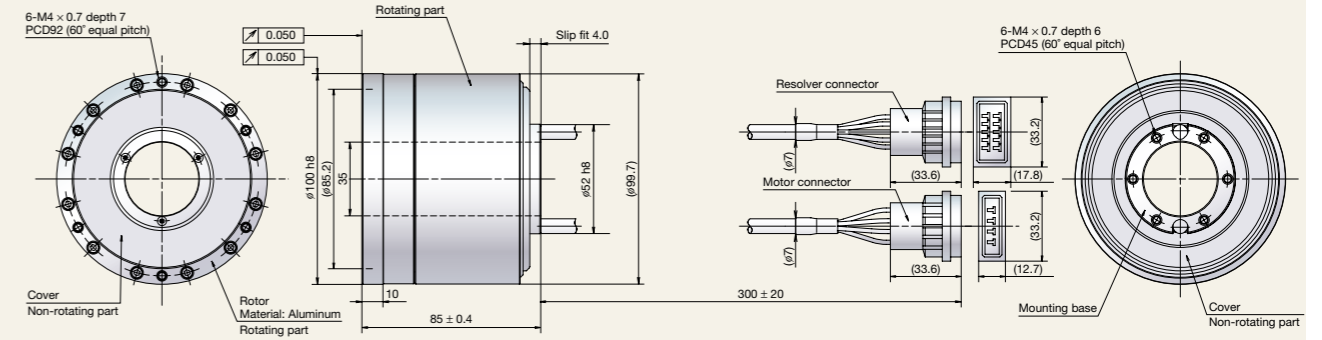
Cable length is up to 8 [m].

### 2.1.3 Rotational Speed and Output Torque Characteristics

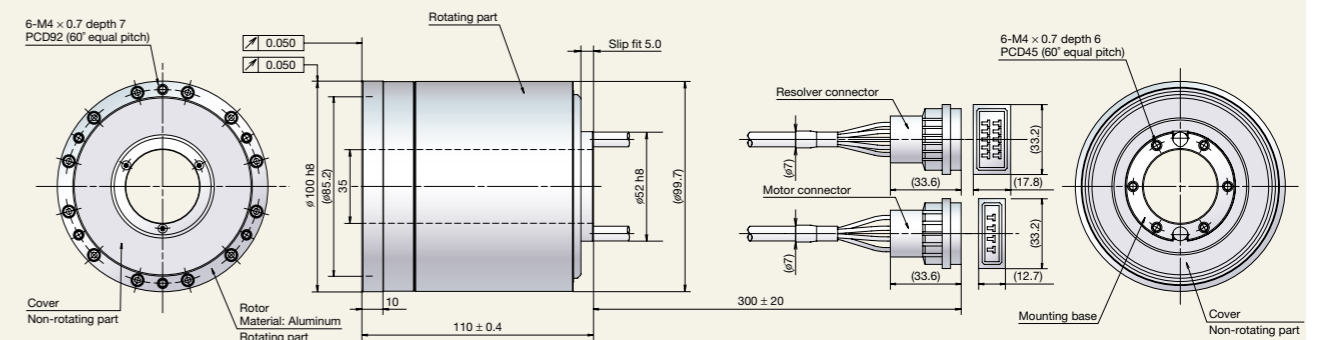


### 2.1.4 Dimensions of PS1 Model Motor

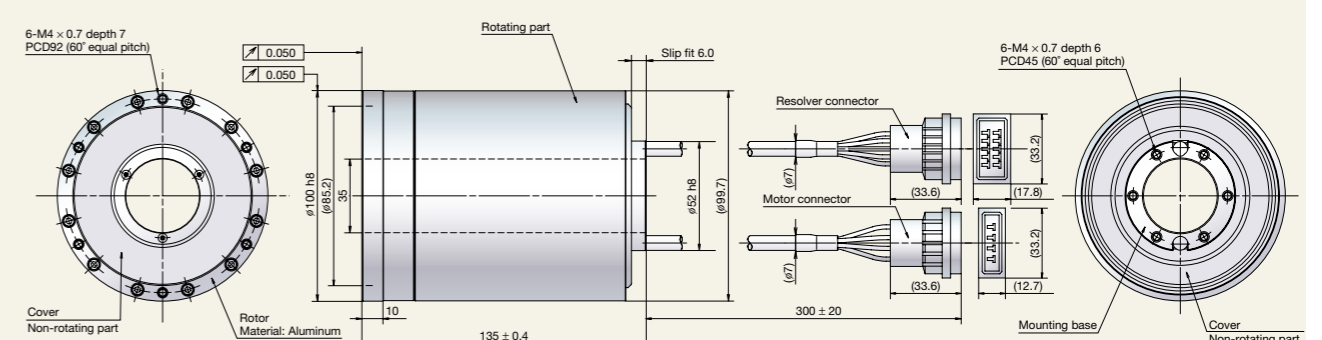
#### M-PS1006KN002



#### M-PS1012KN002



#### M-PS1018KN002



## 2 Motor Specifications

### 2.1.5 Coding for PS3 Model Motor Reference Number

Example of Reference Number **M-PS 3 015 KN 002**

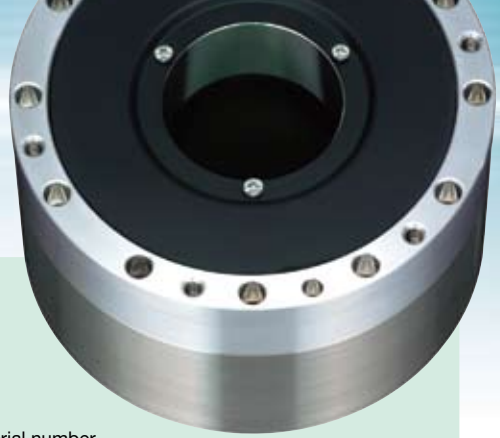
Megatorque Motor PS Series

Motor size code

Maximum output torque [N·m]

Design serial number  
002: Standard  
003: High-precision products (made to order)\*1

KN: Standard



### 2.1.6 PS3 Model Motor Specifications

Functional item	Reference number	M-PS3015KN002	M-PS3030KN002	M-PS3060KN002	M-PS3090KN002
Motor outer diameter [mm]		∅150			
Maximum output torque [N·m]		15	30	60	90
Rated output torque [N·m]		5	10	20	30
Motor height [mm]		85	102	136	170
Motor hollow diameter [mm]		∅56			
Maximum rotational speed [s <sup>-1</sup> ]		10		8	5
Rated rotational speed [s <sup>-1</sup> ]		5		1	1
Resolution of position sensor [counts/rev]		2 621 440			
Absolute positioning accuracy [arc sec]*1		90 (interchangeable type, ambient temperature: 25 ± 5 [°C])			
Repeatability [arc sec]		±2			
Allowable axial load [N]		2 000 (under no radial load)			
Allowable radial load [N]		1 700 (under no axial load)			
Allowable moment load [N·m]		42			
Rotor's moment of inertia [kg·m <sup>2</sup> ]		0.011	0.014	0.019	0.024
Recommended load's moment of inertia [kg·m <sup>2</sup> ]		0-1.1	0-1.4	0.12-1.9	0.12-2.4
Mass [kg]		5.5	6.9	11.0	13.8
Environmental conditions		Ambient temperature 0-40 [°C]; humidity: 20-80 [%]; use indoors, free from dust, condensation and corrosive gas. IP30 equivalent.			

Note: Please consult with NSK in case of a simultaneous application of axial load, radial load and moment load to a Motor.

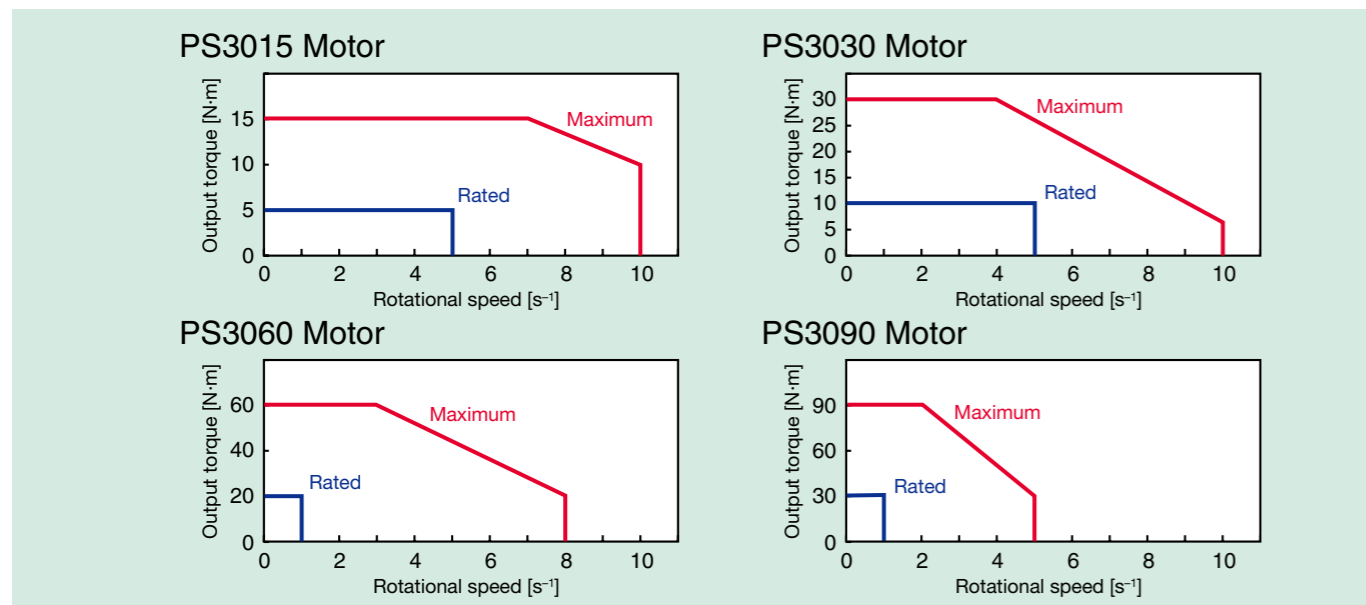
For an oscillating operation less than 45 [°], turn the Motor 90 [°] or more at least once a day.

Do not apply excessive load and/or impact to the motor when inserting the dowel pin.

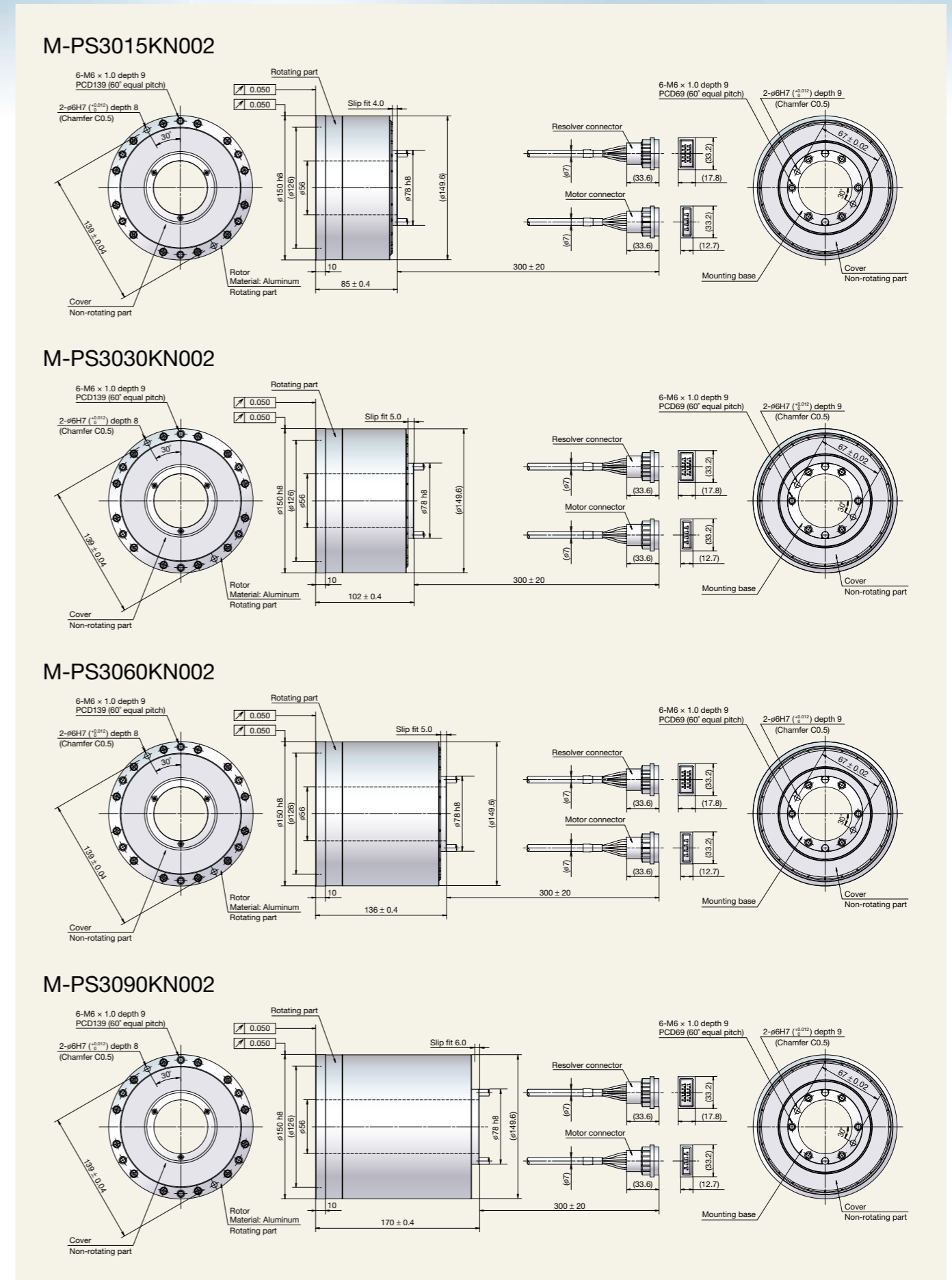
\*1 Absolute positioning accuracy of high-precision products (made to order) is 30 [arc sec]. (interchangeable type, ambient temperature of 25 ± 5 [°C])

Cable length is up to 8 [m].

### 2.1.7 Rotational Speed and Output Torque Characteristics



### 2.1.8 Dimensions of PS3 Model Motor





# 2.2 PN Series Motor

## 2.2.1 Coding for PN Model Motor Reference Number

Example of Reference Number

**M-PN 3 045 KN 001**

Megatorque Motor PN Series

Motor size code

Maximum output torque [N·m]

Design serial number  
201: Standard (PN2)  
001: Standard (PN3 / PN4)

KN: Standard

## 2.2.2 PN Model Motor Specifications

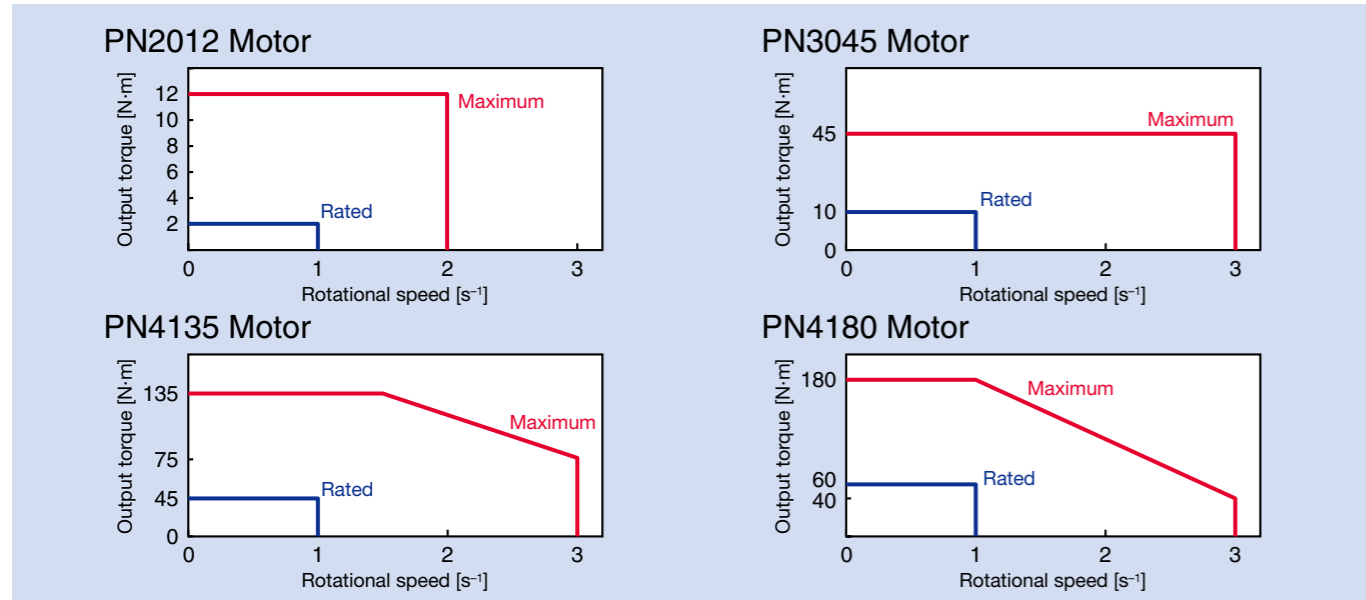
Functional item	Reference number	M-PN2012KN201 (Note 2)	M-PN3045KN001	M-PN4135KN001	M-PN4180KN001
Motor outer diameter [mm]		∅170	∅210	∅280	
Maximum output torque [N·m]		12	45	135	180
Rated output torque [N·m]		2	15	45	60
Motor height [mm]		35	85	95	112
Motor hollow diameter [mm]		36	56	50	
Maximum rotational speed [s <sup>-1</sup> ]		2	3		
Rated rotational speed [s <sup>-1</sup> ]		1			
Resolution of position sensor [counts/rev]		2 621 440			
Absolute positioning accuracy [arc sec]		90 (interchangeable type, ambient temperature: 25 ± 5 [°C])			
Repeatability [arc sec]		±2			
Allowable axial load [N]*1		1 000	4 500	9 500	
Allowable radial load [N]*2		300	4 500	9 500	
Allowable moment load [N·m]		20	80	160	200
Rotor's moment of inertia [kg·m <sup>2</sup> ]		0.0024	0.011	0.057	0.065
Recommended load's moment of inertia [kg·m <sup>2</sup> ]		0.02–0.24	0.11–0.77	0.57–3.99	0.65–4.55
Mass [kg]		3.7	13	26	31
Environmental conditions		Ambient temperature 0–40 [°C]; humidity: 20–80%; use indoors, free from dust, condensation and corrosive gas. IP30 equivalent.			

Note 1: Please consult with NSK in case of a simultaneous application of axial load, radial load and moment load to a Motor.

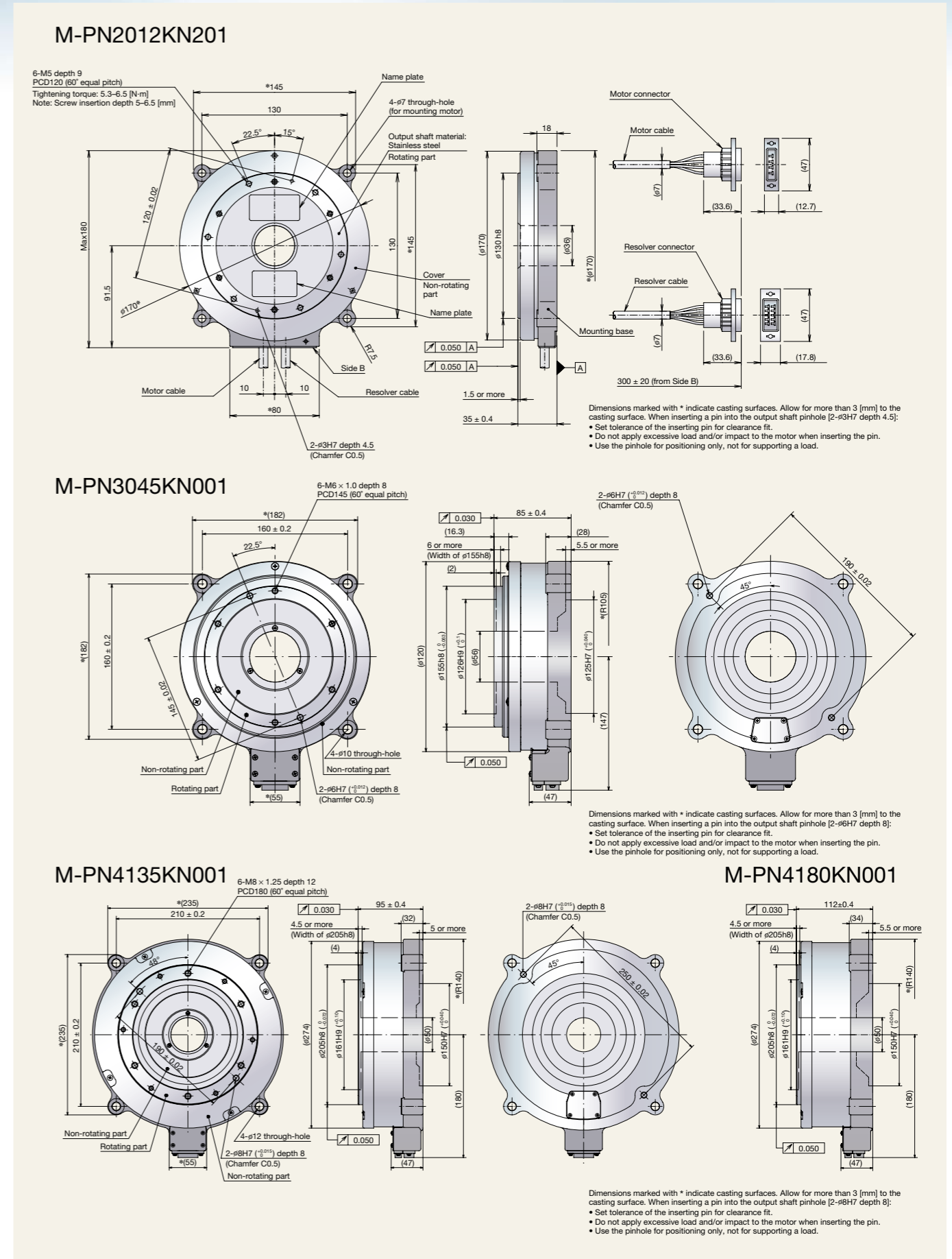
\*1 Under no radial load \*2 Under no axial load  
For an oscillating operation less than 45 [°], turn the Motor 90 [°] or more at least once a day.  
Do not apply excessive load and/or impact to the Motor when inserting the dowel pin.

Note 2: Cable length for PN2012 is up to 8 [m].

## 2.2.3 Rotational Speed and Output Torque Characteristics



## 2.2.4 Dimensions of PN Model Motor



# 3 EDC Driver Unit

## 3.1 Features of EDC Driver Unit

- **Adopts new servo algorithm (achieves settling time of 1 [ms])**

The EDC Driver Unit adopts an original disturbance observer control and preview-based feed-forward control, which significantly reduces the positioning time, especially the settling time (approaching time).

- **Positioning controller function**

Positioning operation can be controlled without complicated communication or upper controller.

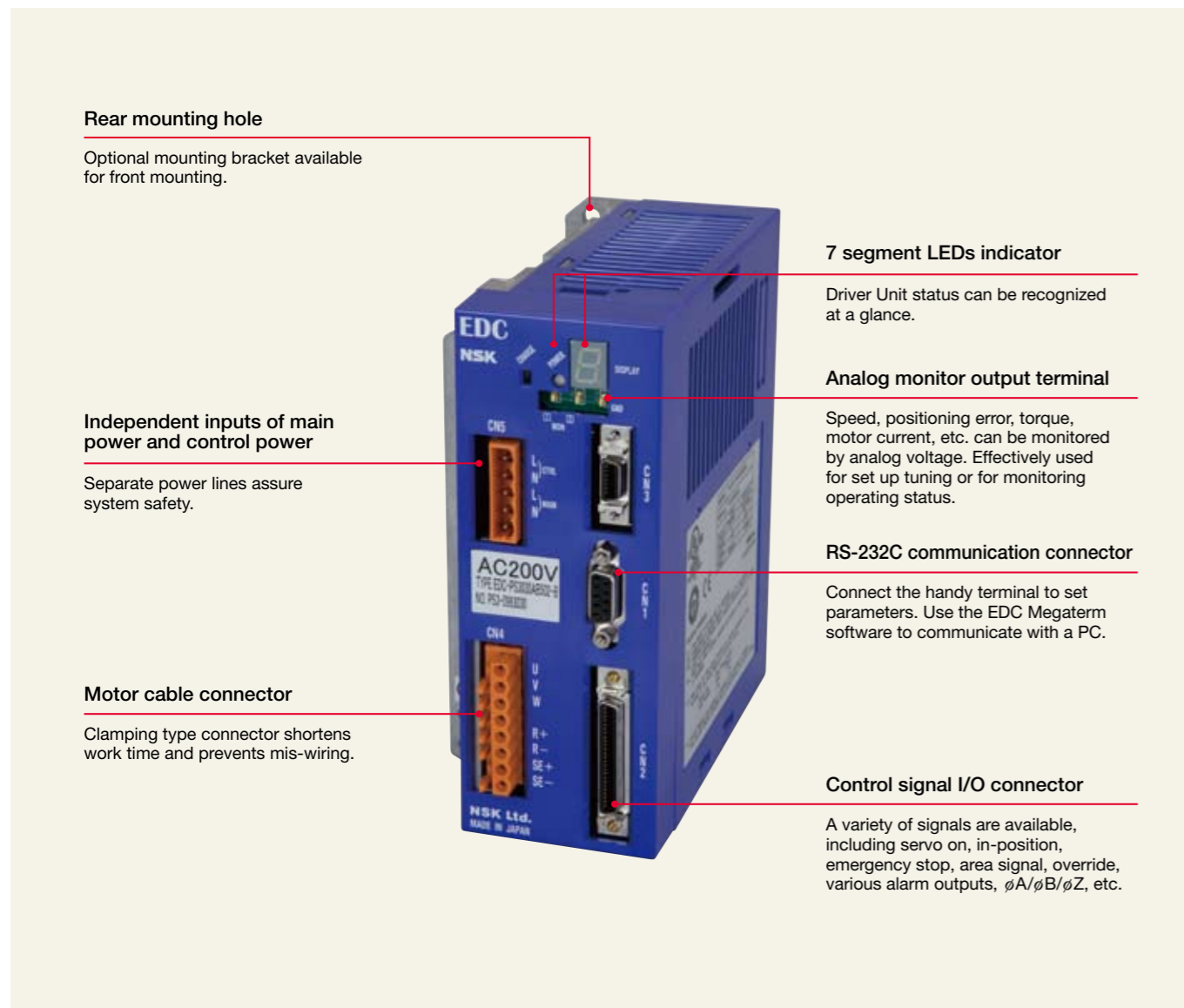
- **Compact Driver Unit**

Combined with special electric components and advanced integration technology, the Driver Unit body is 65% smaller than conventional NSK units.

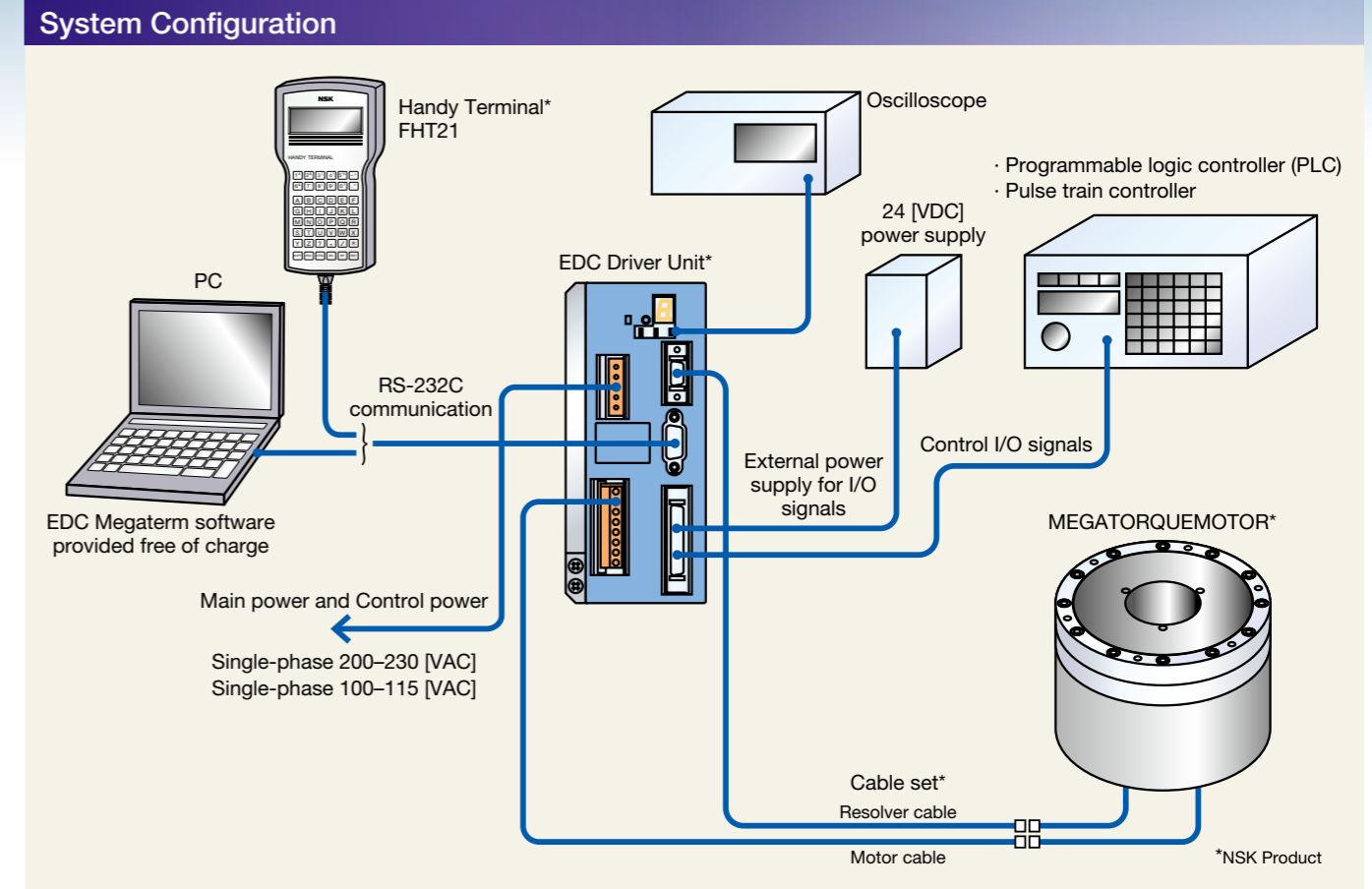
- **Variety of control I/Os**

All control inputs required for positioning are available, including an encoder output, servo control and program control; no additional sensor is required to monitor the status.

## 3.2 Components and functions of EDC Driver Unit



## 3.3 System configuration and EDC Driver Unit Control Technology

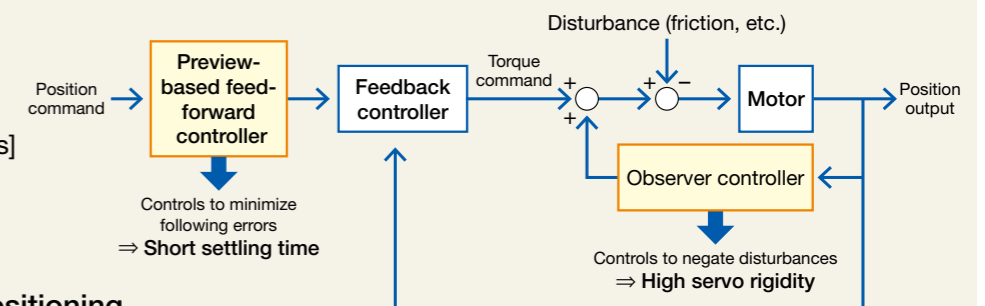


## Control Technology and High-speed Positioning Example

- **Control block diagram**

Adopts new servo algorithm

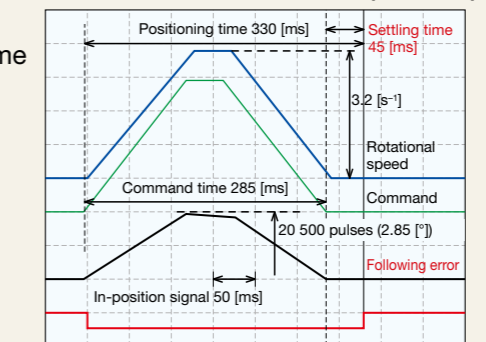
Settling time: Less than 1 [ms]



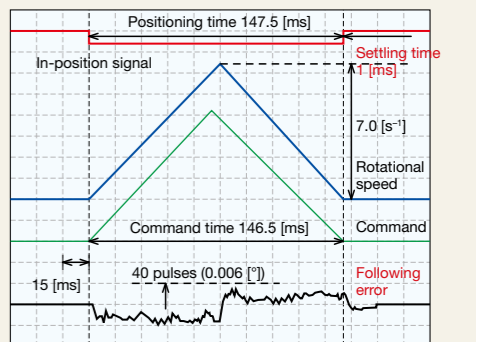
- **Comparison of 180 [°] positioning**

Positioning time = Command time + Settling time

Conventional NSK motor (JS2014)



PS1012 Motor



Settling time	45 [ms]	⇒	1 [ms]
Following error	20 500 pulses	⇒	40 pulses
Positioning time	330 [ms]	⇒	147.5 [ms]



### 3 EDC Driver Units



#### 3.4 Coding for EDC Driver Unit Reference Number

##### EDC Driver Unit Reference Number for PS Series Motor

Example of Reference Number **M-EDC - PS1006 A B 5 02 -01**

EDC Driver Unit  
 Motor model  
 Main power voltage  
 A: 200-230 [VAC] (single-phase)  
 C: 100-115 [VAC] (single-phase)  
 Specification of position sensor  
 B: Incorporates absolute position sensor

No code: No accessories included  
 -01: Connectors, Mounting brackets, and User's Manual (Japanese version)  
 -02: Connectors, Mounting brackets, and User's Manual (English version)  
 Design serial number  
 02: Standard  
 03: High-precision products (made to order)  
 Function 5: Standard  
 C: CC-Link (made to order)

##### EDC Driver Unit Reference Number for PN2 Motor

Example of Reference Number **M-EDC - PN2012 A B 5 02 -01**

EDC Driver Unit  
 Motor model  
 Main power voltage  
 A: 200-230 [VAC] (single-phase)  
 C: 100-115 [VAC] (single-phase)  
 Specification of position sensor  
 B: Incorporates absolute position sensor

No code: No accessories included  
 -01: Connectors, Mounting brackets, and User's Manual (Japanese version)  
 -02: Connectors, Mounting brackets, and User's Manual (English version)  
 Design serial number  
 02: Standard  
 03: High-precision products (made to order)  
 Function 5: Standard  
 C: CC-Link (made to order)

##### EDC Driver Unit Reference Number for PN3 Motor and PN4 Motor

Example of Reference Number **M-EDC - PN3045 A B 5 02 -01**

EDC Driver Unit  
 Motor model  
 Main power voltage  
 A: 200-230 [VAC] (single-phase)  
 C: 100-115 [VAC] (single-phase) (PN3 type only)  
 Specification of position sensor  
 B: Incorporates absolute position sensor

No code: No accessories included  
 -01: Connectors, Mounting brackets, and User's Manual (Japanese version)  
 -02: Connectors, Mounting brackets, and User's Manual (English version)  
 Design serial number  
 02: Standard  
 Function 5: Standard  
 C: CC-Link (made to order)

Accessories vary depending on the function.

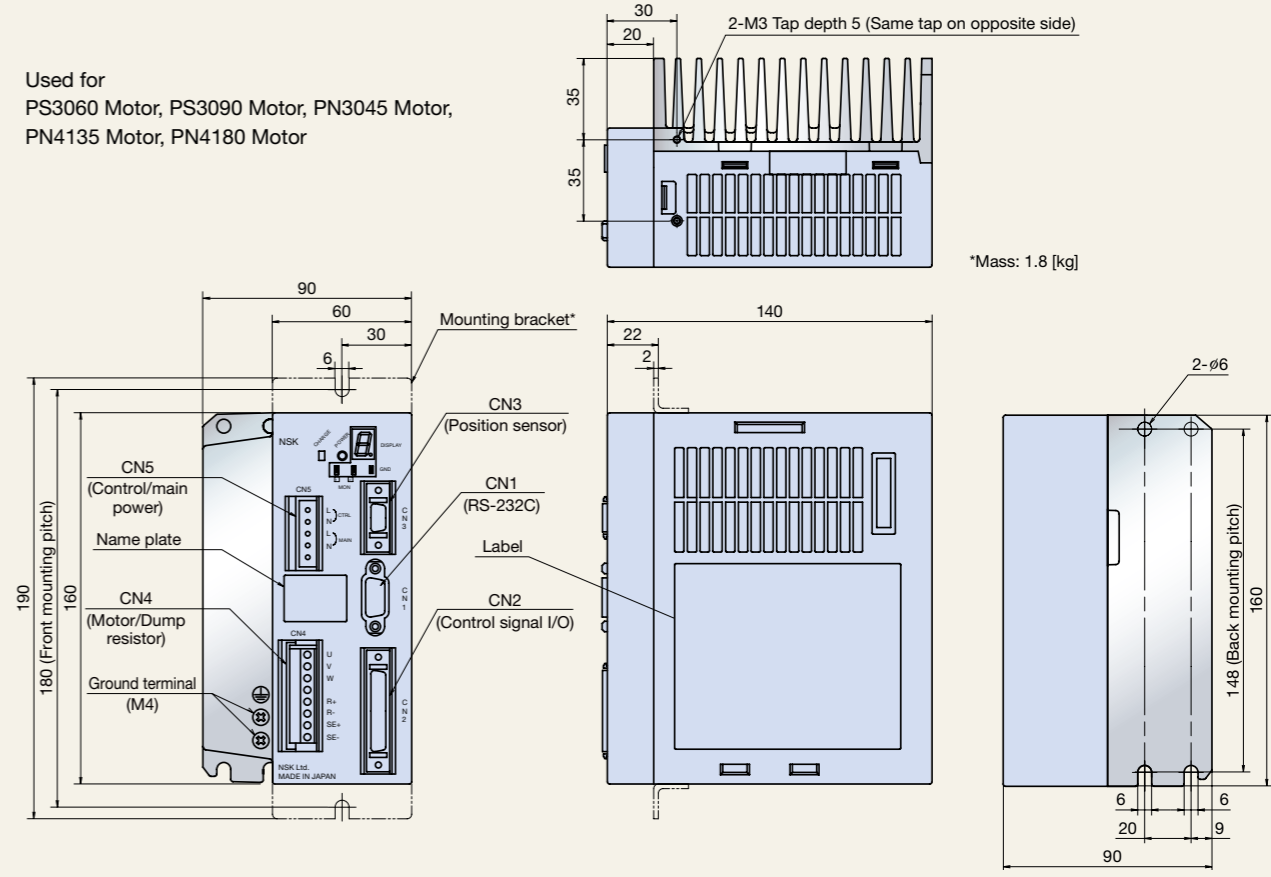
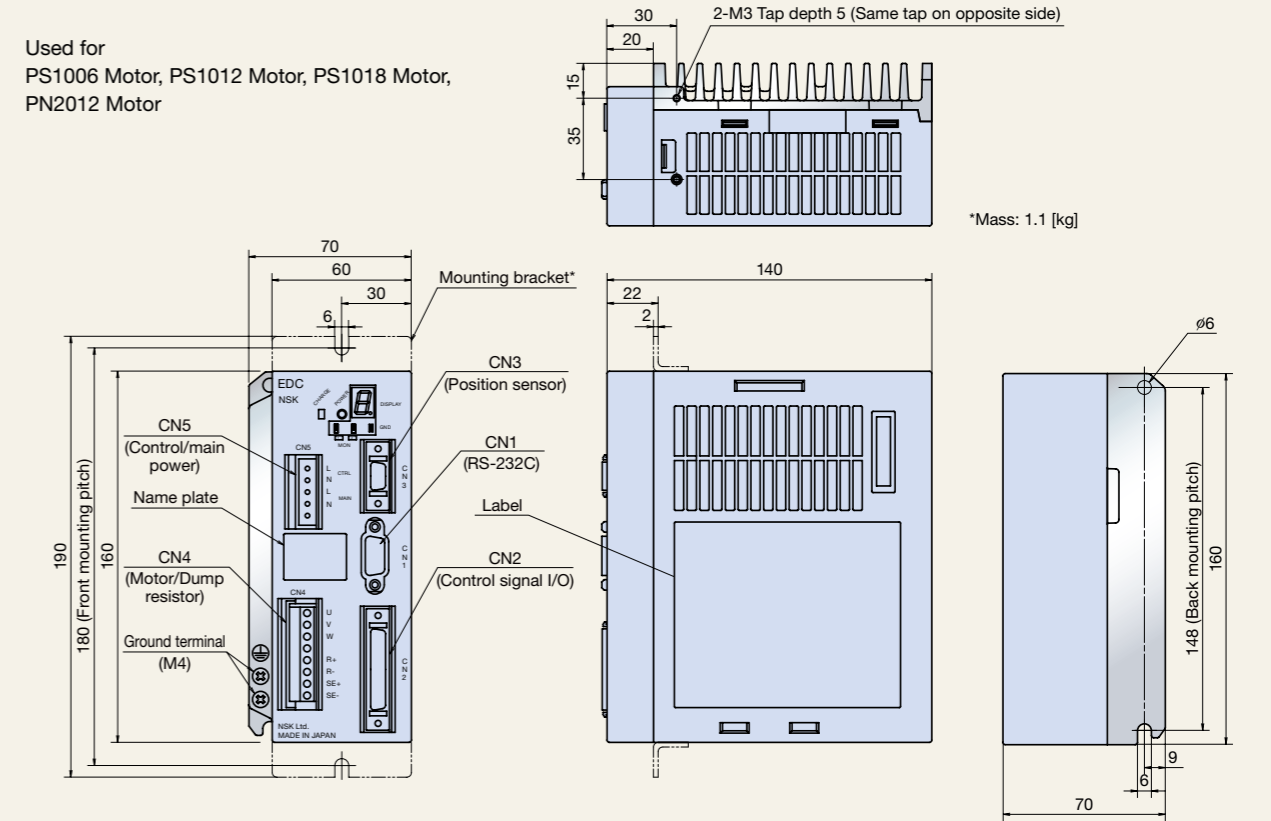
##### Standard accessories

- (1) CN2 connector (user side)  
 Connector: 54306-5019 (Molex), or equivalent      Connector shell: 54331-0501 (Molex), or equivalent
- (2) CN5 connector (user side)  
 Connector: 231-305/026-000 (WAGO), or equivalent      Wiring lever: 231-131(WAGO), or equivalent
- (3) Mounting bracket
- (4) User's Manual (English version)

##### Accessories for EDC Driver Unit (CC-Link Function)

- (1) CN2 connector (user side)  
 Connector: DHF-PDA10-3-A01 (DDK)
- (2) CN5 connector (user side)  
 Connector: 231-305/026-000 (WAGO)  
 Wiring lever: 231-131 (WAGO)
- (3) CN6 connector (user side)  
 Connector: MSTB, 5/5-STF-5, 08AU (Phoenix contact)
- (4) Mounting bracket
- (5) User's Manual (English version)
- (6) User's Manual for CC-Link (English version)

#### 3.5 Dimensions of EDC Driver Unit (Standard Function)

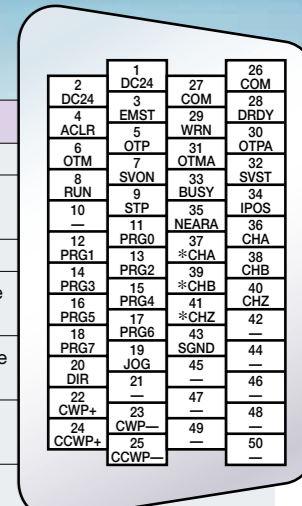


3.6 General Specifications of EDC Driver Unit

Item	Motor model	PS1006	PS1012	PS1018	PS3015	PS3030	PS3060	PS3090	PN2012	PN3045	PN4135	PN4180	
Input power	Rated capacity [VA]	300	400	500	500	800	400	600	100	500	900	1100	
	Maximum capacity [VA]	1 000	1 500	2 000	2 300	2 900	5 000	5 500	2 100	4400	5 000	5 100	
	Control power source	Single phase 100–115 [VAC], single phase 200–230 [VAC]						Single phase 200–230 [VAC]					
	Main power source	Voltage fluctuation range ±10%						Voltage fluctuation range ±10%					
Resolution of position sensor [counts/rev]		2 621 440											
Positioning operation mode		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											
Input signal	Pulse train command	Photocoupler input. Maximum frequency: 1MHz Input format: CW/CCW, Pulse and direction or $\phi A/\phi B$ Resolution changer for universal multiplication is available (1 000–5 242 880 [counts/rev])											
	Control input	Photocoupler input ( $\pm$ common), 17 input ports (Input voltage: 24 [VDC]) Emergency stop, Alarm clear, Over travel limit (+ direction), Over travel limit (– direction), Servo on, Program operation start, Stop, Internal program channel switching 0–7 bit, Jog, Jog direction, (Hold, Velocity, integration OFF, Home Return start, and Home position limit)											
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 [counts/rev] (Quadrupled: 81 920) Maximum: 1 310 720 [counts/rev] (Quadrupled: 5 242 880) *As the maximum frequency is 781K [Hz], the resolution setting limits the maximum velocity.											
	Control output	Photocoupler output ( $\pm$ common), 8 outputs (Max. switching capacity: 24 [VDC] / 50 [mA]) Driver Unit ready, Warning, Over travel limit detection ( $\pm$ direction), Servo state, Busy, In-position, Target proximity A (Target proximity B), Zone A/B/C, Travel limit $\pm$ , Normal, Position error under/over, Velocity under/over, Torque command under/over, Thermal loading under/over, Home return complete, Home position defined											
Alarms		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, Resolver excitation amplifier alarm, Commutation error, Overheat, Main AC Line over voltage, Excess current, Control AC line under voltage, Power module alarm, Excess position error, Program error, Automatic tuning error, Position command/feedback error, Software thermal error, Main AC Line under voltage, Travel limit over, Field bus warning, Home position undefined, Field bus error											
Monitors		Analog monitor x 2, (universal range and offset setting), RS-232C monitor											
Communication		RS-232C serial communication (asynchronous, 9 600 [bps])											
Others		Automatic tuning Function set to Input/output ports available Temporal parameter setting by program is available Individual acceleration/deceleration setting Acceleration profiling											
Option		Field bus (CC-Link)											
Environmental conditions	Operating/Storing temperatures	0 to 50 [°C] for operating / –20 to +70 [°C] for storing											
	Operating/Storing humidity	90% or less [no condensation]											
	Vibration resistance	4.9 [m/s <sup>2</sup> ]											
Internal functions	Regenerative energy absorption	Optional dump resistor											
	Dynamic brake	Functions at power off, servo off and in the occurrence of an alarm.											
Compatible safety regulation	UL	UL508C											
	CE	LVD	EN50178										
		EMC	EMI: EN55011, EMS: EN61000-6-2										
Connector	RS-232C	CN1	D-sub 9 pins										
	Control signal I/O	CN2	Standard specification: Half pitch connector 50 pins CC-Link specification: Half pitch connector 10 pins										
	Position sensor	CN3	Half-pitch connector 14 pins										
	Motor	CN4	Plastic connector (UL and CE compatible)										
	Dump resistor												
	Main/control power source	CN5	Plastic connector (UL and CE compatible)										
CC-Link (option)	CN6	Connector MSTB2, 5/5-STF-5, 08 AU (Phoenix contact)											

3.7 Signal Specifications of 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
	ACLR	4	Alarm clear	Clears warning <sup>*1</sup>
	OTP	5	Over travel limit (+ direction)	If OTP goes active, the Motor servo is locked in the CW direction <sup>*1</sup>
	OTM	6	Over travel limit (– direction)	If OTM goes active, the Motor servo is locked in the CCW direction <sup>*1</sup>
	SVON	7	Servo on	If SVON goes active, the servo turns on and the system waits for a command to be entered <sup>*1</sup>
	RUN	8	Start program	Starts program operation specified by the PRG input <sup>*1</sup>
	STP	9	Stop	Stops positioning operation and execution of the program <sup>*1</sup>
	–	10	(Do not connect)	–
	PRG0	11	Internal program channel selection 0	For a program positioning operation: A combination of ON and OFF of PRG0 to PRG7 inputs specifies channel (0–255) to be executed
	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 <sup>*1</sup>
	DIR	20	Jogging direction	Specifies the direction of jogging <sup>*1</sup>
	–	21	(Do not connect)	–
	CWP+	22	CW pulse train (+)	Pulse train command rotates the Motor in the CW direction
	CWP–	23	CW pulse train (–)	
CCWP+	24	CCW pulse train (+)		
CCWP–	25	CCW pulse train (–)		
COM	26, 27	Output signal common	Common for output signal	
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 <sup>*2</sup>	
OTPA	30	Over travel limit (+ direction) detected	Reports the output of over travel limit (software and hardware) in the plus direction <sup>*2</sup>	
OTMA	31	Over travel limit (– direction) detected	Reports the output of over travel limit (software and hardware) in the minus direction <sup>*2</sup>	
SVST	32	Servo state	Reports states of servo <sup>*2</sup>	
BUSY	33	In-operation	Reports state of positioning operation <sup>*2</sup>	
IPOS	34	In-position	Reports the condition of positioning error and the positioning operation <sup>*2</sup>	
NEARA	35	Target proximity A	Reports that the Motor is approaching the destination <sup>*2</sup> A pulse signal that reports the number of rotations of Motors Output format is line driver	
*CHA	36	Positioning feedback signal $\phi A$		
*CHB	37	Positioning feedback signal $\phi B$		
*CHC	38	Positioning feedback signal $\phi C$		
*CHD	39	Positioning feedback signal $\phi D$		
*CHE	40	Positioning feedback signal $\phi E$		
*CHF	41	Positioning feedback signal $\phi F$		
–	42	(Do not connect)	–	
SGND	43	Signal ground	Ground for the position feedback signal	
–	44–50	(Do not connect)	–	



Carefully follow these instructions for wiring to CN2.

- When wiring to CN2, use shielded wires and a twisted pair for a pulse train input and position feedback output. These wires should be as short as possible (up to 2 [m]).

Selection and optional setting of control Input/Output signal functions

- You may set signal functions of control Input/Output to any port by the parameters.

<sup>\*1</sup> Input signal

- Select up to 16 input signals out of the 22 input signals listed above and then set them to Pin No. 4 to 9 and 11 to 20. (In addition to the Input signals listed above, you may select any of the following signals: Hold, Velocity override, Integration OFF, Home return start, and Home position limit.)
- Pin No. 3 is fixed to the "Emergency stop" signal. (The signal polarity is variable.)

<sup>\*2</sup> Output signal

- Select up to 7 output signals out of the 23 output signals listed above and then assign them to Pin No. 29 to 35. In addition to the Output signals listed above, you may select any of the following signals: 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 Home position defined.
- The output "Driver Unit ready" set to Pin No. 28 can only be replaced with the output signal "Normal." (Signal polarity cannot be changed.)



# 4 Cable Set

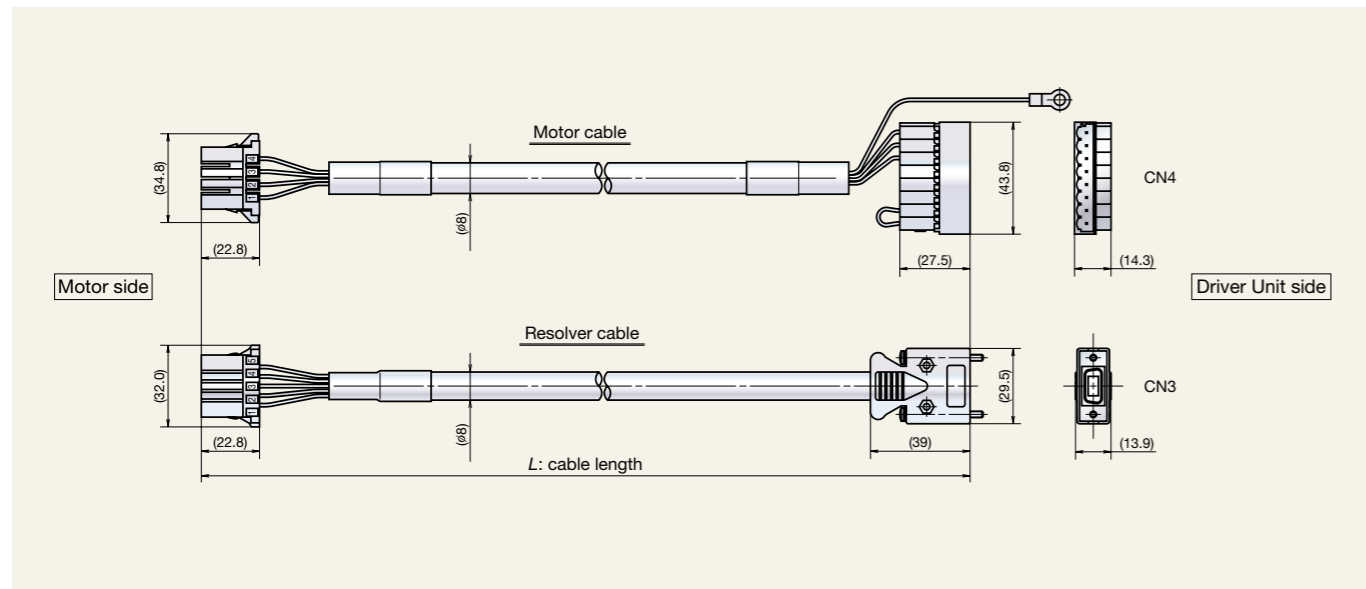
## 4.1 Cable Set Reference Number

Example of Reference Number **M-C 004 SCP 03**

M-C: Cable set for Megatorque Motor  
 004: Cable length Example: 004: 4m  
 SCP: Cable set for EDC Driver Unit  
 03: Fixed use type  
 13: Flexible type

Refer to "9 Motor and EDC Driver Unit Combinations" for correct length.  
 Cable length can be up to 8 [m] for combinations with PN2012 and high-precision products in PS series.

## 4.2 Dimension of Cable Set



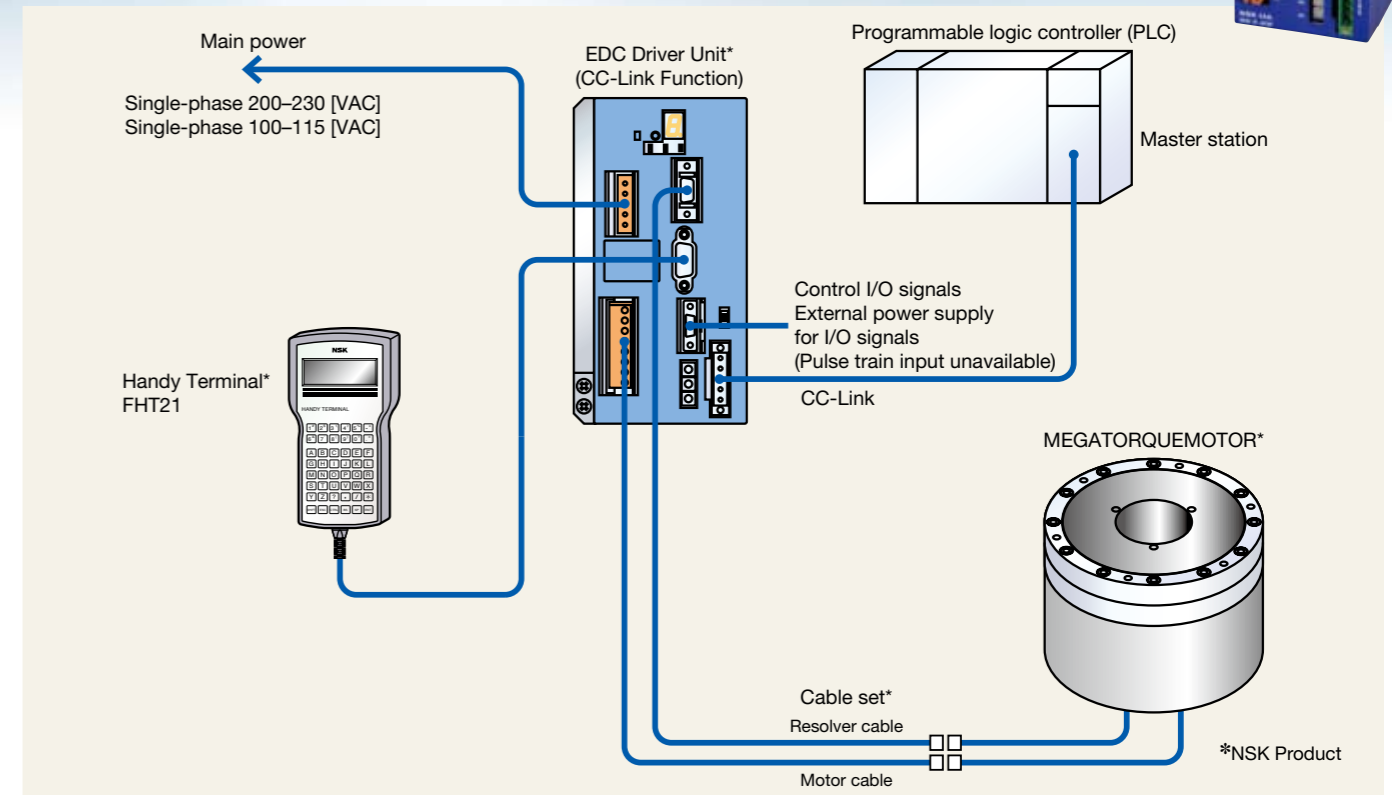
Cable bend radius (for both motor cable and resolver cable)

	Bend radius at fixed side	Bend radius at moving side
Fixed use type	R43 or more	—
Flexible type	R40 or more	R80 or more

# 5 Option

## 5.1 EDC Driver Unit with CC-Link Function

### 5.1.1 System Configuration



- The EDC Driver Unit provides the field bus (CC-Link) compatibility.
- The station numbers and the baud rate can be set by switches on the Driver Unit's front panel.
- Monitoring communication status by LED, and terminating resistor can be switched on/off.
- The EDC Driver Units are fully compatible with CC-Link Ver. 1.10.

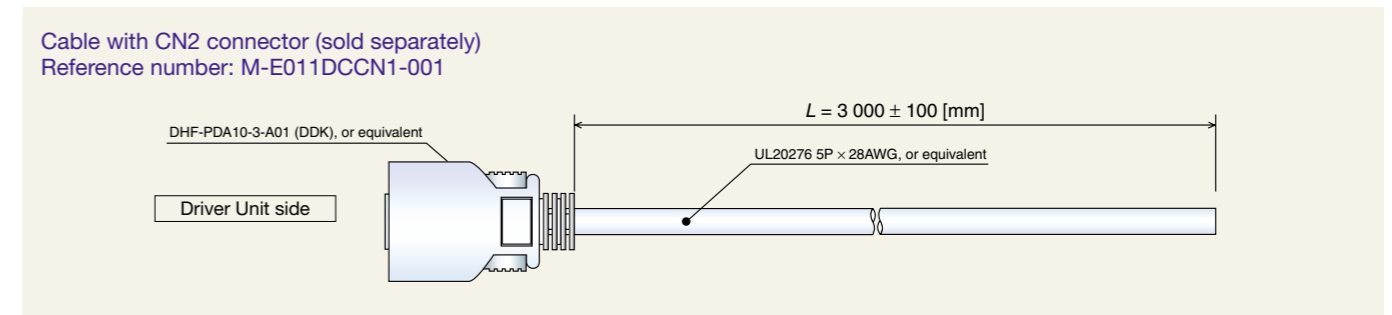
### 5.1.2 I/O Signal Specifications of CN2 (CC-Link Function)

Input/Output	Signal Code	Pin No.	Signal Name	Function
Input signal	DC24	1	24 [VDC] external power supply	External power supply for input signal
	—	2	(Do not connect)	—
	EMST	3	Emergency stop	Terminates positioning operation and the Motor stops by the dynamic brake
	ACLR	4	Clear warning	Clear warning
	OTP	5	Over travel limit (+ direction)	If OTP goes active, the Motor servo is locked in the CW direction
	OTM	6	Over travel limit (- direction)	If OTM goes active, the Motor servo is locked in the CCW direction
	—	7	(Do not connect)	—
Output signal	DRDY	8	Driver Unit ready	Reports that the Motor is ready to rotate (pins are open when the Motor is not ready or when an alarm occurs)
	—	9	(Do not connect)	—
	COM	10	Output signal common	Common for output signal

1 DC24V	6 OTM
2 —	7 —
3 EMST	8 DRDY
4 ACLR	9 —
5 OTP	10 COM

Pin-out

\*Specifications of Driver Units, except CN2, are the same as standard products (refer to page 18).



5.1.3 Dimensions of EDC Driver Unit (CC-Link Function)

Used for  
PS1006 Motor, PS1012 Motor, PS1018 Motor,  
PN2012 Motor, PS3015 Motor, PS3030 Motor

Mass: 1.3 [kg]

Used for  
PS3060 Motor, PS3090 Motor, PS3045 Motor,  
PN4135 Motor, PN4180 Motor

Mass: 2.0 [kg]

Labels for both units include:  
 - Mounting bracket\*  
 - CN3 (Position sensor)  
 - CN1 (RS-232C)  
 - CN2 (Control I/O)  
 - CN4 (Motor/Dump resistor)  
 - CN5 (Control/main power)  
 - Grounding terminal (M4)  
 - SW1, SW2, SW3, SW4 (Station number setting switches)  
 - Thermal sensor leads  
 - Dump resistor leads

5.2 Dump Resistor (M-E014DCKR1-100-101)

5.2.1 Dimensions and Schematics

M-E014DCKR1-100

Specifications

- Rated wattage: 7 [W]
- Resistance: 100 [ $\Omega$ ]
- Thermal sensor temperature: 135 [ $^{\circ}$ C]

M-E014DCKR1-101

Item	Specifications
Resistor	<ul style="list-style-type: none"> <li>Rated wattage: 120 [W]</li> <li>Resistance: 100 [<math>\Omega</math>]</li> <li>Thermal sensor temperature: 100 [<math>^{\circ}</math>C]</li> </ul>
Fan	<ul style="list-style-type: none"> <li>Rated voltage: 24 [VDC]</li> <li>Rated current: 0.2 [A]</li> <li>Lock sensor equipped</li> <li>Output circuit: open collector</li> <li>Maximum collector voltage: +27.6 [V]</li> <li>Maximum collector current: 5 [mA]</li> </ul>

Connect with 24 [VDC] input for cooling fan.

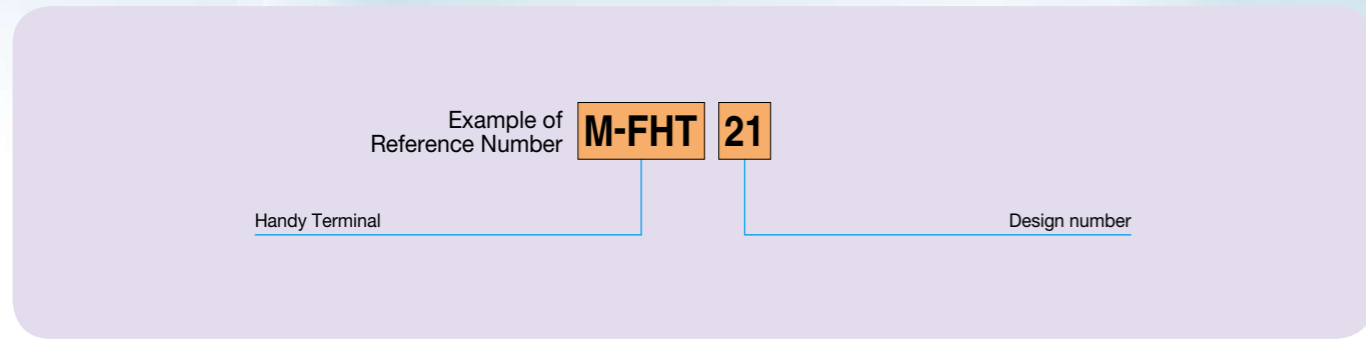
5.2.2 Connection to EDC Driver Unit

M-E014DCKR1-100

M-E014DCKR1-101



5.3 Handy Terminal



Handy Terminal FHT21 is an easy-to-handle RS-232C communication terminal for inputting parameters and programs to the EDC Driver Unit.

- LCD screen: 20 letters × 4 lines, no external power source required, cable length: 3 [m]

Conventional models M-FHT01 and M-FHT11 are also supported by the EDC Driver Unit.



5.4 Options

Item	Reference number	Contents
Connector	M-E014DCFS1-001	CN2 connector (user side) for standard function
	M-E014DCFS1-006	CN2 connector (user side) for CC-Link function
	M-E014DCFS1-002	CN5 connector (user side)
	M-E014DCFS1-003	CN6 connector (user side)
	M-E011DCCN1-001	Cable with CN2 connector for CC-Link function
Mounting bracket	M-E050DCKA1-001	Driver Unit mounting brackets
Manual	M-E099DC0C2-155	User's Manual (Japanese version)
	M-E099DC0C2-158	User's Manual (English version)
	M-E099DC0C2-156	CC-Link option instruction manual (Japanese version)
	M-E099DC0C2-157	CC-Link option instruction manual (English version)
Dump resistor	M-E014DCKR1-100	Dump resistor
	M-E014DCKR1-101	Dump resistor (large capacity)
Accessory set	M-E014DCFS1-004	Set of M-E014DCFS1-001, M-E014DCFS1-002, and M-E050DCKA1-001

6 Selection of Megatorque Motors

To select appropriate Megatorque Motors, examine the following data.

- 6.1 Loads on the Motor ((1) Moment of inertia of the load; (2) Axial load, radial load, and moment load; (3) Holding torque required during halts)
- 6.2 Positioning Accuracy
- 6.3 Positioning Time (Index Time)
- 6.4 Selection of Dump Resistor
- 6.5 Effective Torque Calculations

6.1 Loads on the Motor

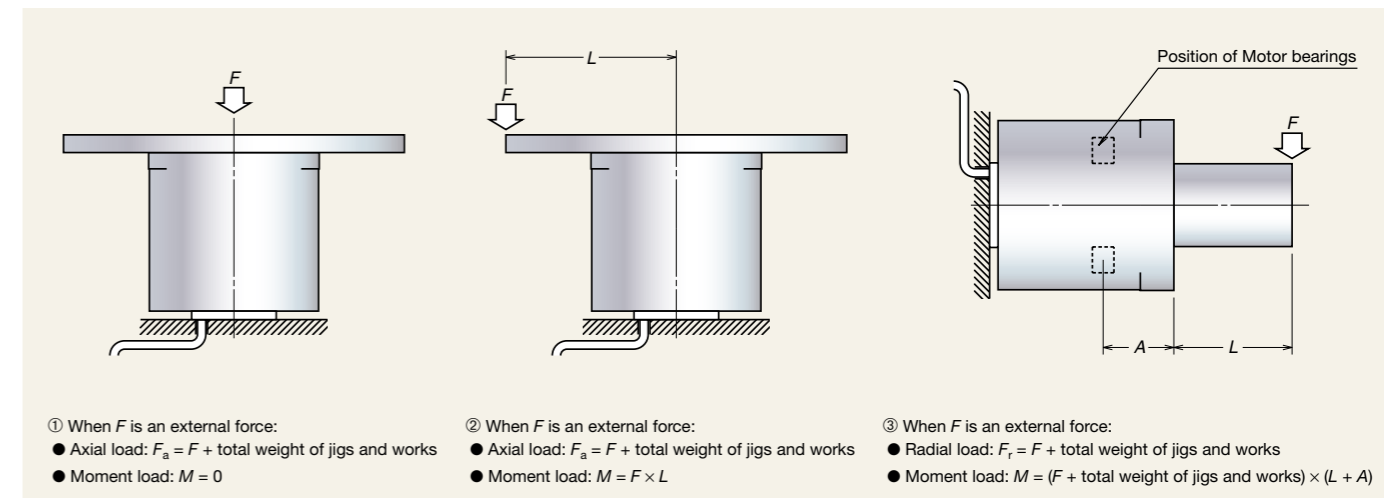
((1) Moment of inertia of the load; (2) Axial load, radial load, and moment load; (3) Holding torque required during halts)

(1) Load moment of inertia *J*

When the Megatorque Motor System is used, the size of the moment of inertia of the load mounted to the Motor rotor will significantly affect the acceleration/deceleration characteristics. Thus, calculation of the moment of inertia of the load *J* is required.

(2) Axial load, radial load, and moment load

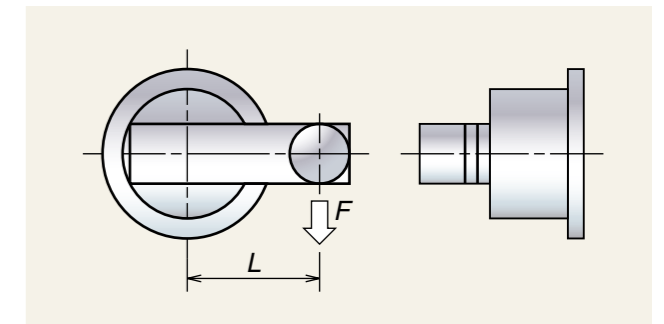
Calculate the load on the Motor. The relationship between external force and load is represented in the following three patterns. Ensure the axial load/radial load and the moment load are set within the allowable axial, radial and moment loads. (Refer to 2. Motor Specifications in this catalog for allowable loads.)



Motor model	PS1006 PS1012 PS1018	PS3015 PS3030 PS3060 PS3090	PN2012	PN3045	PN4135 PN4180
Dimension A [mm]	30.2	32.9	16.7	33.8	54.2

(3) Holding torque required during halts

When the arm is halted at the following position, the torque, equal to  $F \times L$ , will be applied on the Motor as a load torque. Therefore, the rated torque of the Motor, equal to or greater than the load torque, is required.



6.2 Positioning Accuracy

The positioning accuracy of the Megatorque Motor System is considered by two respects as follows:

- (1) Absolute positioning accuracy: 90 [arc sec] (interchangeable)
- (2) Repeatability: ±2 [arc sec]

## 6 Selection of Megatorque Motors

### [Example 1]

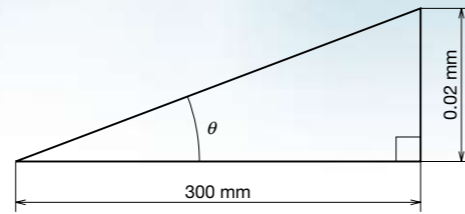
We examine the compatibility of the PS Series Motors, assuming a required repeatability of  $\pm 0.02$  [mm] at 300 [mm] distance from the center.

From  $\tan \theta = 0.02 \div 300$

$$\begin{aligned} \theta &= \tan^{-1}(0.02 \div 300) \\ &= 3.8 \times 10^{-3} [^\circ] \\ &= 14 [\text{arc sec}] \end{aligned}$$

Therefore,  $\pm 14 > \pm 2$ .

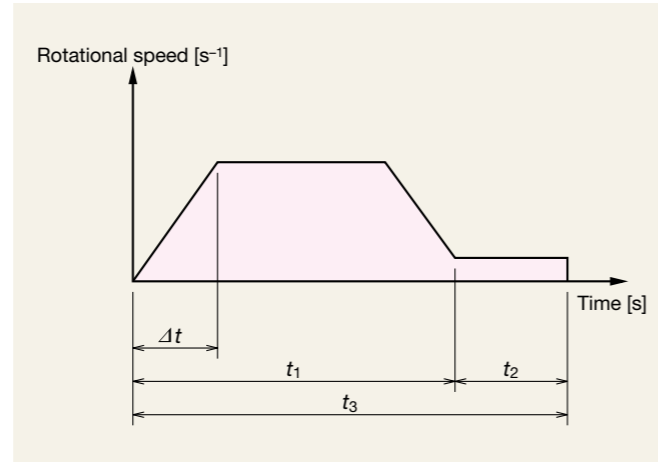
Both PS1 and PS3 Models can be used in terms of positioning accuracy.



### 6.3 Positioning Time (Index Time)

When a Megatorque Motor is used to index an angle, index times can be roughly calculated as follows.

$J_m$ : Load moment of inertia	[kg·m <sup>2</sup> ]
$J_r$ : Rotor moment of inertia	[kg·m <sup>2</sup> ]
$N$ : Rotational speed of the Motor	[s <sup>-1</sup> ]
$T$ : Output torque at the rotational speed $N$	[N·m]
$T_m$ : Load torque	[N·m]
$t_1$ : Travel time	[s]
$t_2$ : Settling time	[s]
$t_3$ : Positioning time	[s]
$\Delta t$ : Accelerating/decelerating time	[s]
$\theta$ : Rotational angle	[°]
$\eta$ : Safety coefficient (normally 1.5)	



In accordance with the list above,

$$\Delta t = \frac{(J_m + J_r) \times 2\pi N}{(T - T_m)} \times \eta$$

$$t_1 = \frac{\theta}{360 \times N} + \Delta t$$

$$t_3 = t_1 + t_2$$

Where  $T - T_m > 0$ , and  $2 \times \Delta t \leq t_1$

Please refer to the following table for the settling time. Since the settling time will also be affected by factors such as the magnitude of the moment of inertia of the load and rigidity of the whole structure, the settling time is not absolute.

Required repeatability [arc sec]	Settling time $t_2$ [s]
$\pm 2$ to $\pm 10$	0.1
$\pm 10$ to $\pm 100$	0.04
$\pm 100$ and above	0.001

### 6.4 Selection of Dump Resistor

(1) Obtain rotational energy of Megatorque Motor during deceleration.

Calculate the rotational energy using the following equation:

$$\begin{aligned} \text{Rotational energy} &= 1/2 \times J \times \omega^2 [\text{J}] \\ &= 1/2 \times J \times (2\pi N)^2 [\text{J}] \\ J &= J_r + J_m \end{aligned}$$

$J_r$ : Rotor's moment of inertia [kg·m<sup>2</sup>]  
 $J_m$ : Moment of inertia of the load [kg·m<sup>2</sup>]  
 $N$ : Rotational speed [s<sup>-1</sup>]

(2) Regenerative energy capacity by internal capacitors

The regeneration energy that can be charged by the internal capacitors is 28 [J] (200 [VAC]).

(3) Calculate energy consumed by Dump resistor

Energy consumed by Dump resistor [J] = Rotational energy [J] - 28 [J] capacitor absorption energy.

When the difference is zero or less, no Dump resistor is necessary.

When the difference is greater than zero, use the following procedure to obtain the required capacity for a Dump resistor.

(4) Calculate required capacity for Dump resistor

Required capacity for a Dump resistor [W] = Energy consumed by Dump resistor [J] / (Operation cycle [s]  $\times$  0.25).

0.25: Load ratio of Dump resistor use

When the quotient is 7 or less, use Dump resistor: M-E014DCKR1-100. (optional)

When the quotient is 120 or less, use Dump resistor: M-E014DCKR1-101. (optional)

Please contact NSK when the quotient exceeds 120.

### 6.5 Effective Torque Calculations

When selecting a PS Series Motor, it is necessary to consider the maximum required torque and the effective torque required for the actual operation.

Here, we examine a motor that can rotate 90° in 0.2 [s], assuming that the load moment of inertia is 0.05 [kg·m<sup>2</sup>]. We will also calculate the effective torque when a standard operation cycle is 0.6 [s].

Conditions: Maximum rotational speed = 2.5 [s<sup>-1</sup>]

Rotational acceleration = 25 [s<sup>-2</sup>]

Repeatability =  $\pm 2$  arc sec

Dwell time = 0.09 [s]

$J_m$  (load moment of inertia) = 0.05 [kg·m<sup>2</sup>]

$J_r$  (moment of inertia of the rotor) = 0.019 [kg·m<sup>2</sup>] (for PS3060)

- Since the rotational acceleration is 25 [s<sup>-2</sup>], we calculate the approximate required torque using the following equation.  
 Required torque\* = (load moment of inertia + moment of inertia of the rotor)  $\times$  angular acceleration  
 $= (0.05 + 0.019) \times 2\pi \times 25$   
 $= 10.8$  [N·m]  
 Therefore, the candidate selection is a motor with a maximum output torque of 10.8 [N·m] or larger.  
 The PS1 Model (excluding PS1006) or PS3 Model can be selected.

\*Since the moment of inertia of the rotor of the motor varies depending on the motor, the required torque needs to be recalculated for each motor.

- The effective torque required for the actual operational pattern in use (see following diagram) needs to be examined. Here, we will determine whether the PS3060 meets the operational conditions.

Equations:  $T$ : Torque at accelerating [N·m]

$J_m$ : (Load moment of inertia) = 0.05 [kg·m<sup>2</sup>]

$J_r$ : (Rotor moment of inertia) = 0.019 [kg·m<sup>2</sup>]

$\alpha$ : Rotational acceleration [s<sup>-2</sup>] = 25 [s<sup>-2</sup>]

$\eta$ : Safety coefficient = 1.3

Required torque at accelerating/decelerating

$$T = \eta (J_m + J_r) \times \alpha = 1.3 \times (0.05 + 0.019) \times 2\pi \times 25 = 14.1$$
 [N·m]

$t_1$  = accelerating/decelerating time = 0.2 [s],  $t_2$  = settling time = 0.01 [s],

$t_3$  = dwell time = 0.09 [s],  $t_4$  = cycle time  $t_1 + t_2 + t_3 = 0.3$  [s]

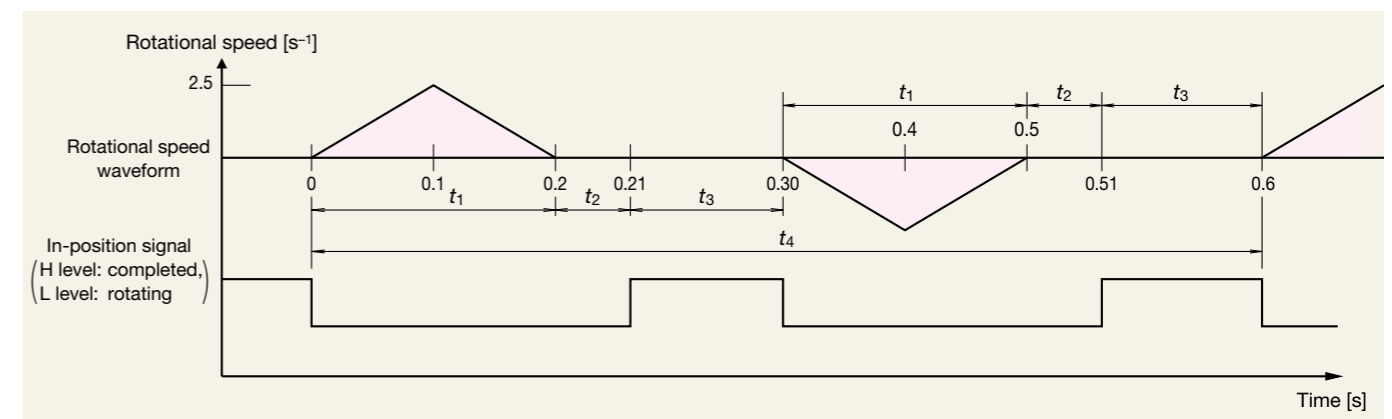
$$\text{Effective torque} = \sqrt{\frac{T^2 \times t_1 \times 2}{t_4}} = 11.5$$
 [N·m]

$$\text{Rotational energy} = 1/2 \times J \times (2\pi N)^2 = 1/2 \times (0.05 + 0.019) \times (2\pi \times 2.5)^2 = 8.5$$
 [J]

The effective torque is 11.5 [N·m], which is less than the PS3060's rated output torque of 20 [N·m].

Therefore, the PS3060 sufficiently meets the operational conditions. External regenerative resistance is not necessary.

- In case results do not meet rated torque  $\leq$  effective torque, recalculation with revised conditions is required.





# 7 Positioning Time Diagrams

The positioning time for Megatorque Motors is calculated in accordance with "6.3 Positioning time." When dwell time is relatively longer than accelerating/decelerating time (dwell time > accelerating/decelerating time x 10), rough positioning time can be determined using the following positioning time diagrams.

These diagrams only apply under the following conditions.

- (1) The motor is directly connected to the load (without gear reducer, belt, or couplings), and the rigidity of the load is sufficiently high (natural frequency: More than 50 [Hz]).
- (2) No load torque is applied to the motor.

The following conditions require additional considerations.

**a. When the load's moment of inertia exceeds the allowable moment load and is off the diagram:**

Operation is possible, although much more time may be required than shown in the diagram, since rotational speed and acceleration are limited.

**b. When there is no diagram for the relevant positioning angle:**

An appropriate calculation is required. No calculation, however, is effective for very small angles.

Settling time includes additional 0.1 [s]. Settling time may be shortened when accurate repeatability is not required.

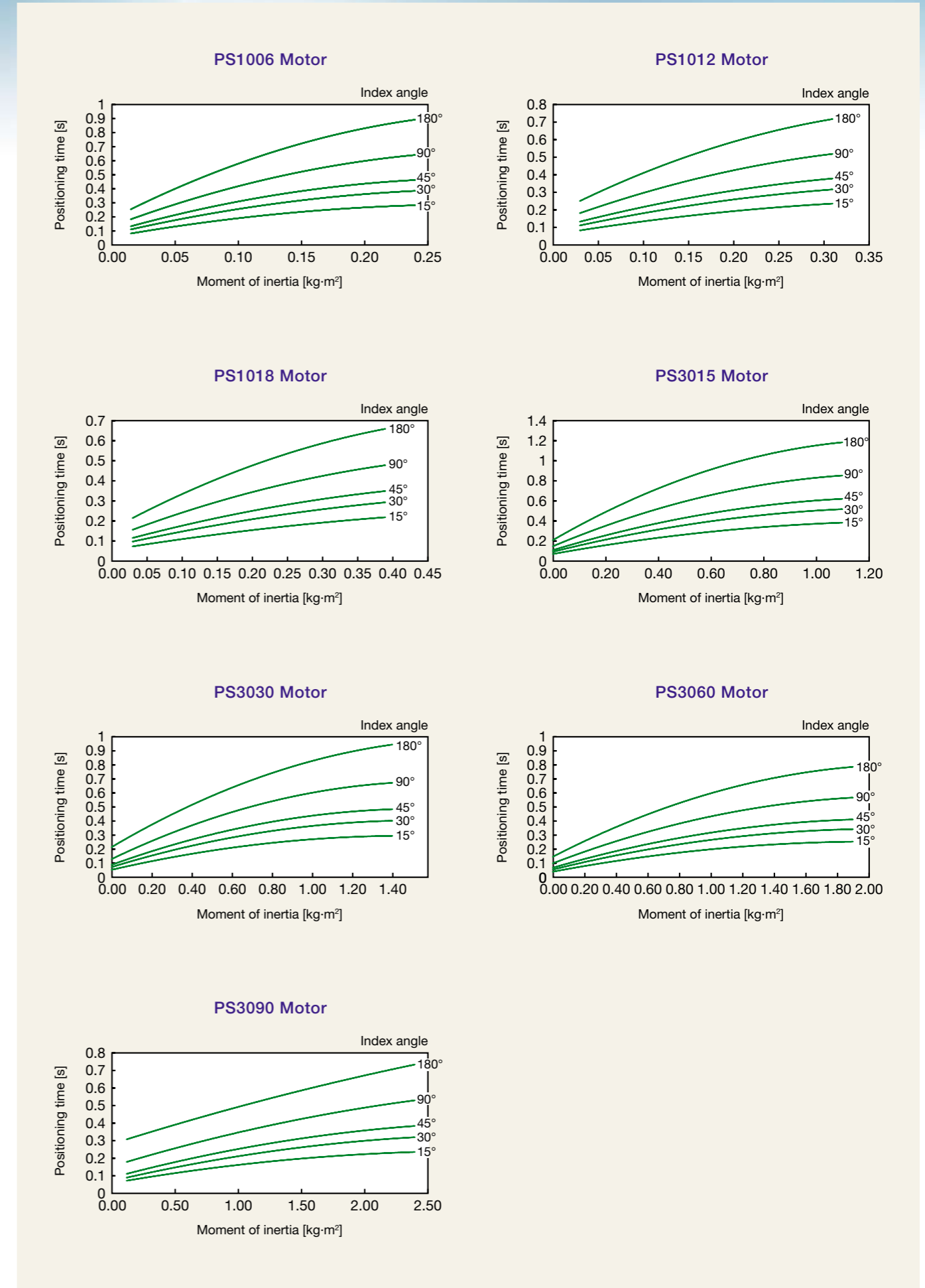
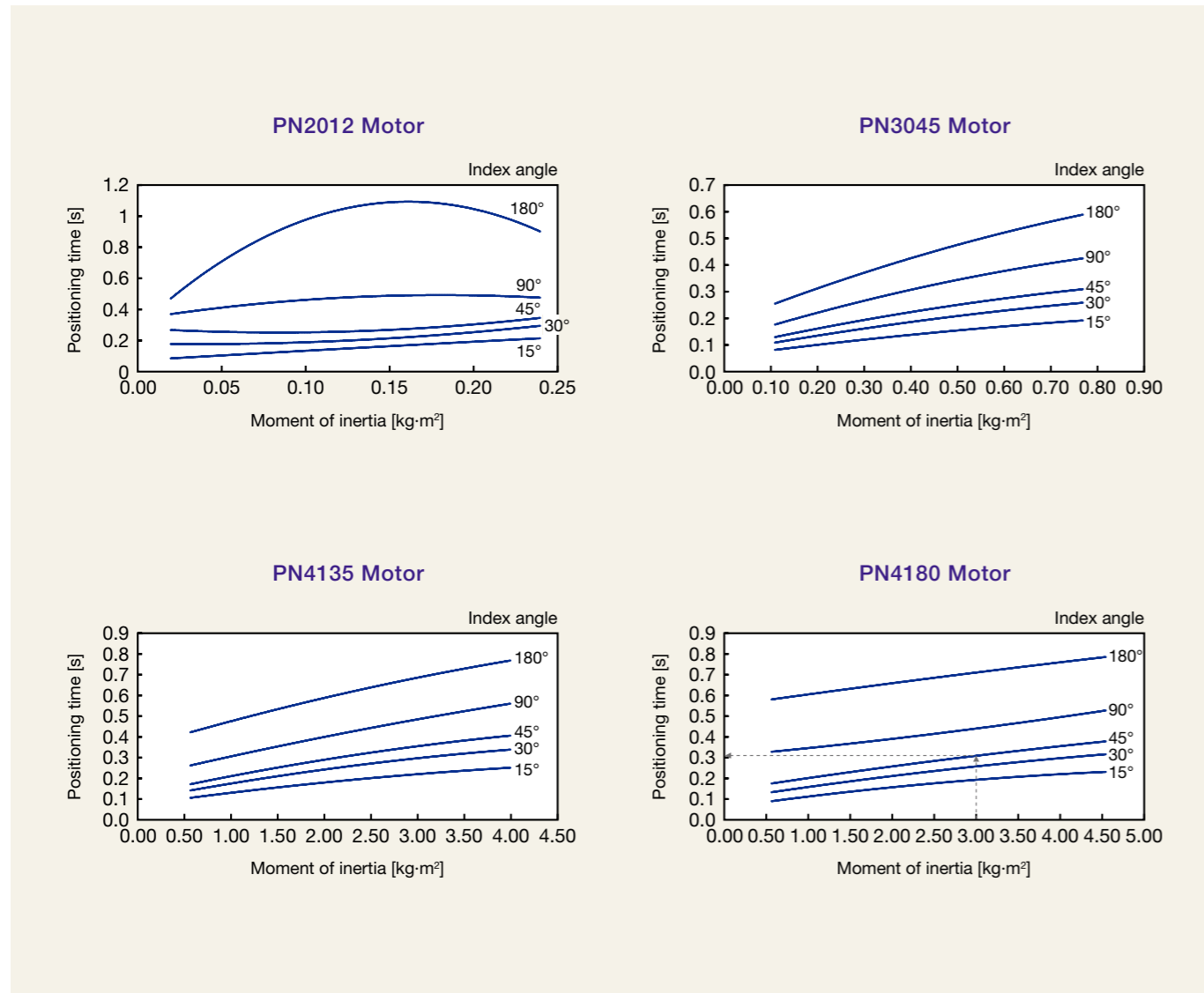
Example: Motor: PN4180

Moment of inertia: 3.0 [kg·m<sup>2</sup>]

Index angle: 45 [°]

Minimum positioning time of 0.31 [s] is determined according to the dashed line in the following diagram.

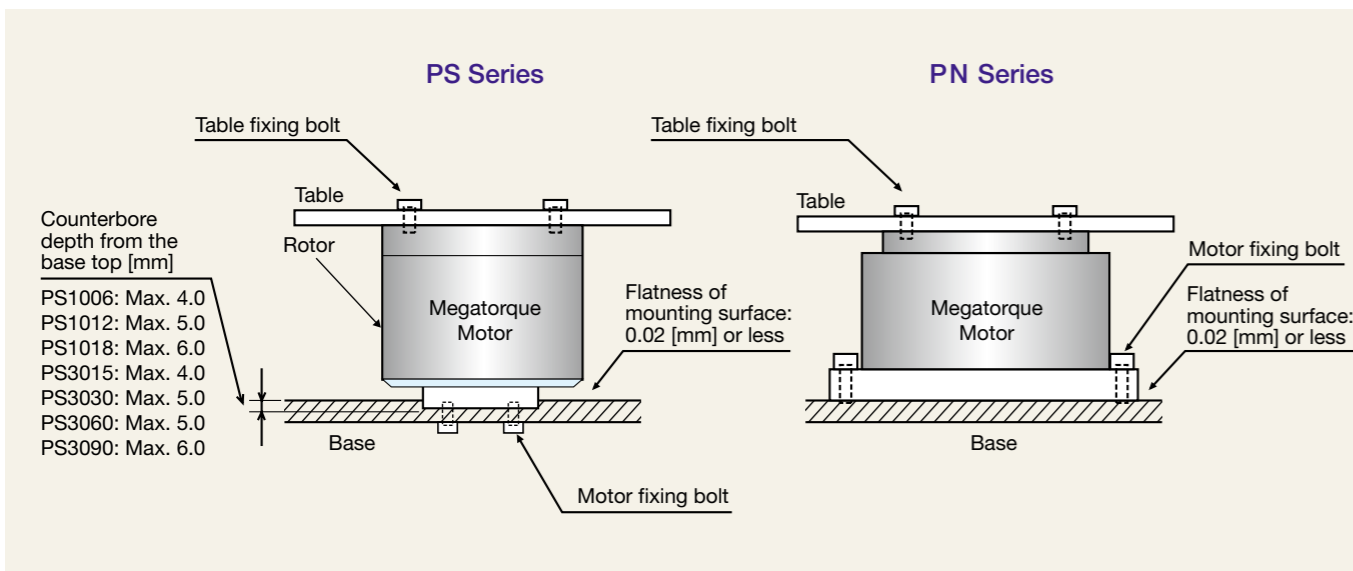
Required repeatability [arc sec]	Settling time [s]
±2 to ±10	0.1
±10 to ±100	0.04
±100 and above	0.001



# 8 Installation

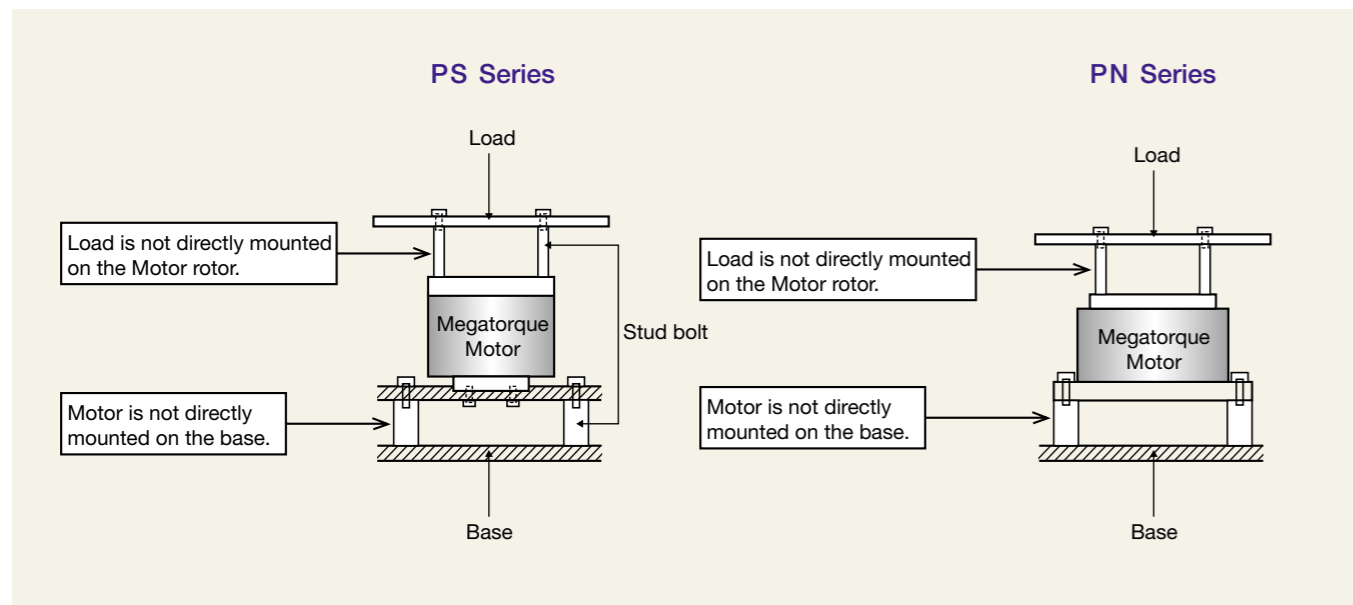
## 8.1 Installation of Motor

- Install and secure the Motor on a solid base, otherwise mechanical vibrations may occur.
- Attach the Motor on the base using the tapped mounting holes on the underside of the Motor.
- The mounting flatness should be level within 0.02 [mm].
- The Motor can be attached either horizontally or vertically.
- Take care not to push up the underside cover when attaching the motor. (PS Series)
- Please see below figure for counterbore depth from base top. (PS Series)
- Do not use the leads of a motor cable or a resolver cable with moving parts. The bend radius of leads should be at least R30 [mm].



Note: If a Motor is installed as indicated in the figure below, mechanical vibrations will be produced and the velocity loop proportional gain (VG) of the Motor cannot be increased. Therefore, the ability to secure the Motor at a stop position becomes poor, resulting in overshoot. Since smooth motor operation cannot be expected under this configuration, the following countermeasures must be taken.

- Directly mount load on the motor rotor (or add dummy inertia).
- Directly mount Motor on the base.



## 8.2 Dummy Inertia

The natural frequency of the entire direct drive mechanism must be high enough to effectively use its features by firmly fixing the motor to a rigid mechanism and ensuring the motor load is rigid. The mounting of additional inertia (dummy inertia) directly to the motor rotor is recommended for the following conditions.

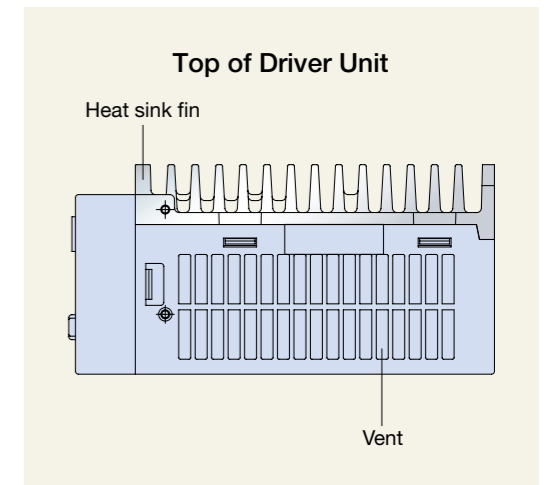
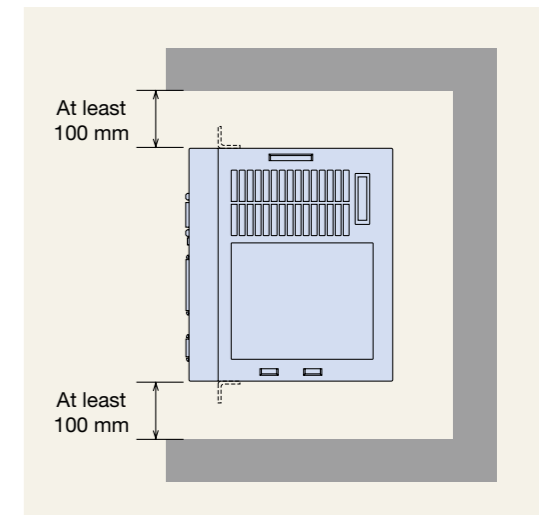
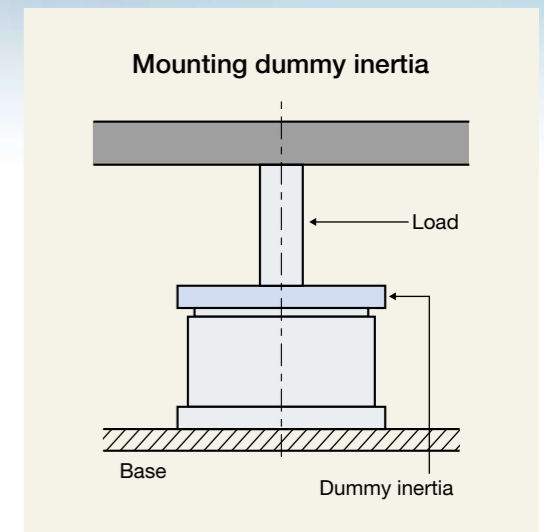
- When the load cannot be directly connected with the motor rotor, but only connected with a key, etc.
- When the load is directly connected, but torsional vibration occurs due to a slim shaft.
- When the inertia of the entire load is very small because the load is driven by a ball screw, etc.
- When there is play resulting from the load using a sprocket chain, gear mechanism, etc.

As a general rule, select a dummy inertia that is 20% of the load inertia. Select dummy inertia as follows when the load uses a reduction gear:

$$\frac{\text{Indirectly connected inertia}}{\text{Reduction ratio}^2 \times \text{Directly connected inertia}} \leq 5$$

## 8.3 Installation of EDC Driver Unit

- Make sure that the EDC Driver Unit is installed in an upright position. The Driver Unit is naturally air cooled, so the fin should be in a vertical position.
- Ambient temperatures should be in a range from 0 to 50 [°C]. The Driver Unit cannot be used in excess of 50 [°C]. A sufficient space of at least 100 [mm] should be provided both above and below the Driver Unit in a control cabinet.
- Operate the Driver Unit in an environment in which internally generated heat can be dissipated. If heat is trapped above the Driver Unit, open the space above it to allow for the heat to dissipate (in this case, also take steps to prevent the entry of dust) or provide a forced-air cooling system.
- Use the Driver Unit in a control cabinet with IP54 or higher. Protect the Driver Unit from exposure to oil mist, cutting water, cutting dust, coating gas, etc., to prevent their entry into the Driver Unit through ventilation openings, which may cause circuit failure.
- When two or more Driver Units are arranged in a row, as in the case of multi-axis combinations, adjacent driver units must be separated by a space of at least 10 [mm].
- The Driver Unit can be attached to a panel using front mounting brackets (optional).
- The power consumption of the Driver Unit is max. 55 [W].





# 9 Motor and EDC Driver Unit Combinations

## 9.1 PS Series and EDC Driver Unit Combinations

Motor Outer Diameter	Motor Reference Number	EDC Driver Unit Reference Number (* indicates accessories specification)	Power Voltage	Cable Reference Number	Main Specifications
ø100	M-PS1006KN002	M-EDC-PS1006AB502-**	AC200-AC230	M-C0**SCP03 (Fixed use type)  M-C0**SCP13 (Flexible type)  ** indicates cable length.  01: 1 [m] 02: 2 [m] 03: 3 [m] 04: 4 [m] 05: 5 [m] 06: 6 [m] 08: 8 [m] 10: 10 [m] 15: 15 [m] 20: 20 [m] 30: 30 [m]	256 program channels  Pulse train input (Photocoupler)
		M-EDC-PS1006CB502-**	AC100-AC115		
	M-PS1012KN002	M-EDC-PS1012AB502-**	AC200-AC230		
		M-EDC-PS1012CB502-**	AC100-AC115		
	M-PS1018KN002	M-EDC-PS1018AB502-**	AC200-AC230		
		M-EDC-PS1018CB502-**	AC100-AC115		
ø150	M-PS3015KN002	M-EDC-PS3015AB502-**	AC200-AC230		
		M-EDC-PS3015CB502-**	AC100-AC115		
	M-PS3030KN002	M-EDC-PS3030AB502-**	AC200-AC230		
		M-EDC-PS3030CB502-**	AC100-AC115		
	M-PS3060KN002	M-EDC-PS3060AB502-**	AC200-AC230		
		M-EDC-PS3060CB502-**	AC100-AC115		
	M-PS3090KN002	M-EDC-PS3090AB502-**	AC200-AC230		
		M-EDC-PS3090CB502-**	AC100-AC115		
ø100	M-PS1006KN002	M-EDC-PS1006ABC02-**	AC200-AC230	CC-Link function  256 program channels	
		M-EDC-PS1006CBC02-**	AC100-AC115		
	M-PS1012KN002	M-EDC-PS1012ABC02-**	AC200-AC230		
		M-EDC-PS1012CBC02-**	AC100-AC115		
	M-PS1018KN002	M-EDC-PS1018ABC02-**	AC200-AC230		
		M-EDC-PS1018CBC02-**	AC100-AC115		
ø150	M-PS3015KN002	M-EDC-PS3015ABC02-**	AC200-AC230		
		M-EDC-PS3015CBC02-**	AC100-AC115		
	M-PS3030KN002	M-EDC-PS3030ABC02-**	AC200-AC230		
		M-EDC-PS3030CBC02-**	AC100-AC115		
	M-PS3060KN002	M-EDC-PS3060ABC02-**	AC200-AC230		
		M-EDC-PS3060CBC02-**	AC100-AC115		
	M-PS3090KN002	M-EDC-PS3090ABC02-**	AC200-AC230		
		M-EDC-PS3090CBC02-**	AC100-AC115		

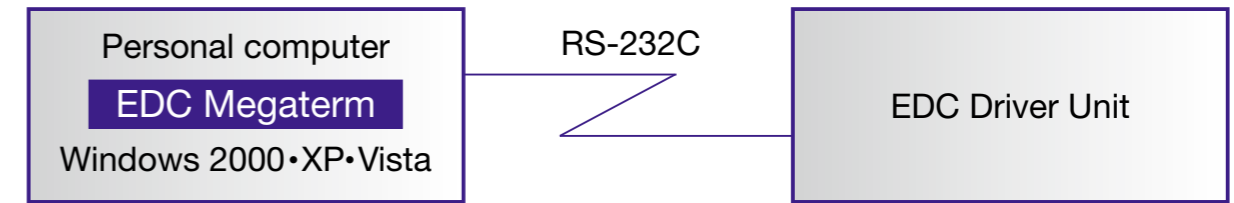
## 9.2 PN Series and EDC Driver Unit Combinations

Motor Outer Diameter	Motor Reference Number	EDC Driver Unit Reference Number (* indicates accessories specification)	Power Voltage	Cable Reference Number	Main Specifications
ø170	M-PN2012KN201	M-EDC-PN2012AB502-**	AC200-AC230	Refer to the above table.  However, maximum cable length for PN2012 is 8 [m].	256 program channels  Pulse train input (Photocoupler)
		M-EDC-PN2012CB502-**	AC100-AC115		
ø210	M-PN3045KN001	M-EDC-PN3045AB502-**	AC200-AC230		
		M-EDC-PN3045CB502-**	AC100-AC115		
ø280	M-PN4135KN001	M-EDC-PN4135AB502-**	AC200-AC230		
		M-EDC-PN4180KN001	AC200-AC230		
ø170	M-PN2012KN201	M-EDC-PN2012ABC02-**	AC200-AC230		CC-Link function  256 program channels
		M-EDC-PN2012CBC02-**	AC100-AC115		
ø210	M-PN3045KN001	M-EDC-PN3045ABC02-**	AC200-AC230		
		M-EDC-PN3045CBC02-**	AC100-AC115		
ø280	M-PN4135KN001	M-EDC-PN4135ABC02-**	AC200-AC230		
		M-EDC-PN4180KN001	AC200-AC230		

# 10 “EDC Megaterm” Application Software

Once installed on your computer, this software enables the editing, preparation and control of EDC Driver Unit programs and parameters. It also facilitates the allocation and monitoring of control input/output. And its oscilloscope function allows for easy confirmation of Motor operation. EDC Megaterm can be downloaded for free from the NSK Web site.

RS-232C communication cable is available (option).  
Type: M-C003RS03 (cable length: 3 [m])



### Functions

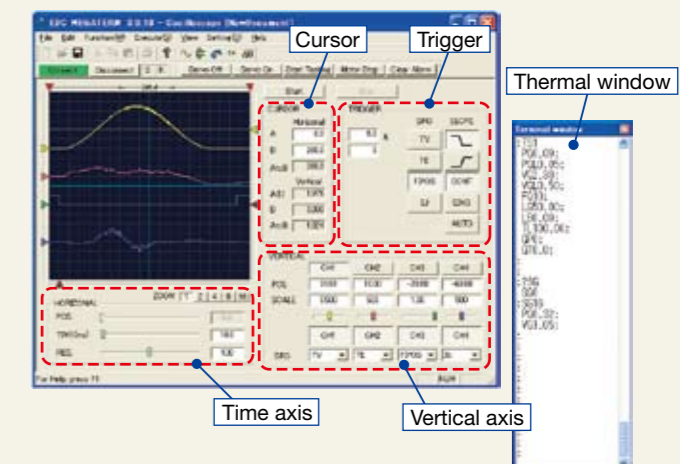
- Oscilloscope function
- Allocation and monitoring of control input/output
- Parameter editing
- Channel editing
- Others:
  - Upload/download parameter and channel data
  - Terminal



### Main Functions

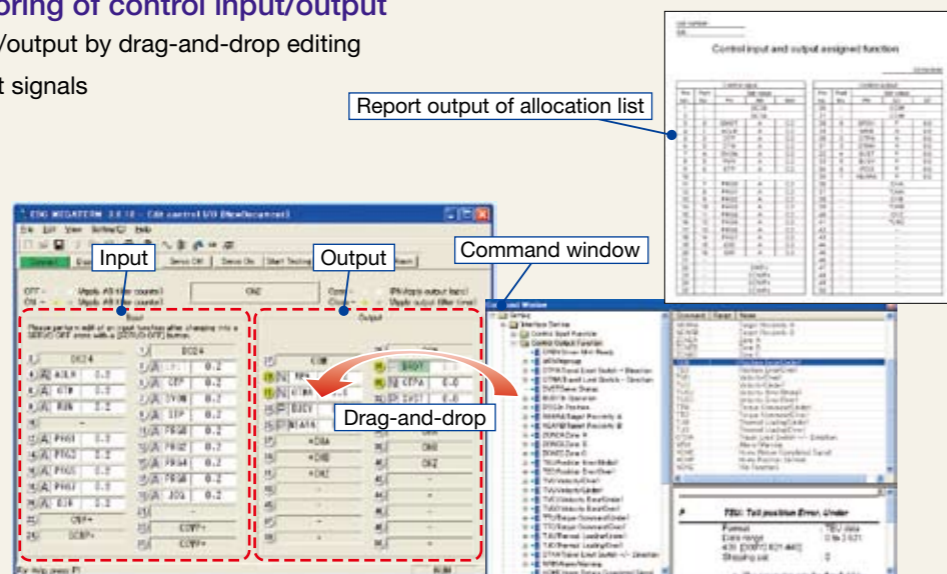
#### 1. Oscilloscope function

- 4-channel oscilloscope, 10 [k sampling/s] maximum
- Anything that can be monitored using the handy terminal can be displayed on the oscilloscope.
- Monitor scale is adjustable.
- Measured waveforms are output as bitmaps or CSV format.



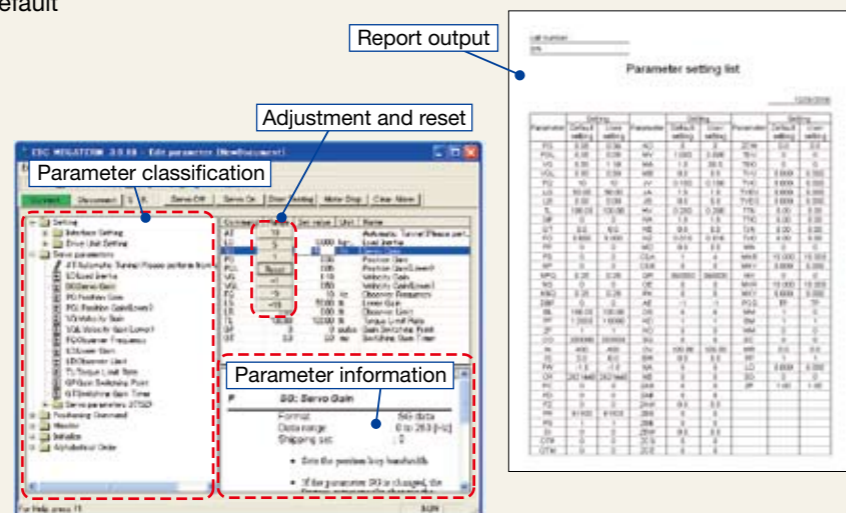
2. Allocation and monitoring of control input/output

- Allocation of control input/output by drag-and-drop editing
- Monitoring of input/output signals
- Output of allocation lists



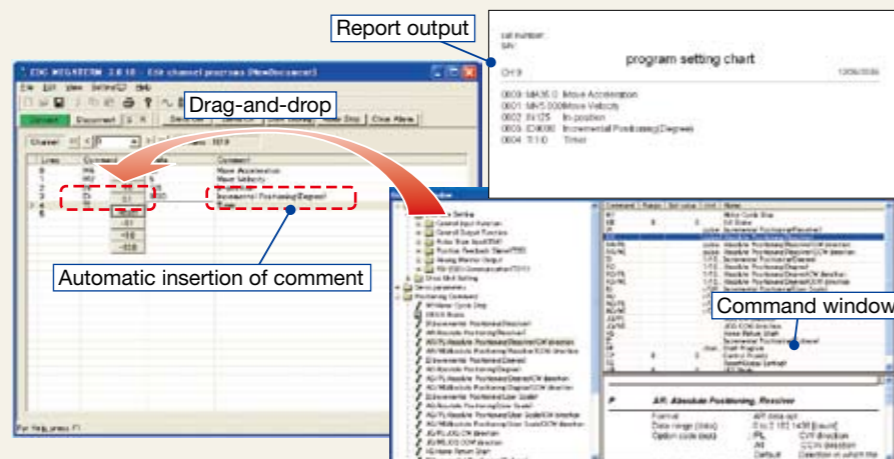
3. Parameter edits

- Parameter edits take effect in real time (off-line editing is also supported)
- Parameter-by-parameter reset to default
- Help function for parameters
- Report of parameter setting



4. Channel edits

- Drag-and-drop edits from command window
- Direct input capability also supported (automatic insertion of comments)
- Report of program list



CE Marking

- **Low voltage command** (applicable standard: EN50178)  
The Megatorque Motor PS Series is incorporated into machinery as components. NSK set low voltage standards to ensure the Megatorque Motor PS Series fully complies with the EC Directive. The standards have been certified by TÜV, a third-party testing and certification organization.
- **EMC command** (applicable standards: EMI EN55011 and EMS EN61000-6-2)  
NSK defined installation models (conditions) for the Megatorque Motor PS Series, including installation space and wiring between Driver Units and Motors, and set EMC command standards based on 4 [m] cable models, which have been certified by TÜV.  
When Megatorque Motor PS Series is incorporated into machinery, real-world installation and/or wiring conditions may differ from those of established models. Therefore, it is necessary to check for EMC command compliance (especially radiation and conduction noise) in the machinery incorporating the PS Series Motors.

Compliance with UL Standards

- **Motor**  
Compliant with UL1004 (File No.: E216970)
- **Driver Unit**  
Compliant with UL508C (File No.: E216221)
- **Cable set**  
UL-compliant cables are used

Warranty Period

- The warranty period is either one year from delivery or 2 400 hours of operation, whichever comes first.

Limited Warranty

- The warranty is limited to the products supplied by NSK Ltd.
- The defective products will be repaired free of charge within the applicable warranty period.
- Repairs after the expiration of the applicable warranty period will be subject to payment.

Exemption Clause

- The warranty will not apply to any of the following cases:
  - Failure due to work and operation performed not in accordance with the instruction manual designated by the supplier
  - Failure due to improper handling, misuse, modification or careless operation performed by the user
  - Failure resulting from causes not attributable to the supplier
  - Failure caused by modification or repair made by anyone other than the supplier
  - Failure resulting from causes beyond the reasonable control of the supplier, including natural disasters or other accidents
- The warranty is limited to delivered units and the supplier shall not be liable for any incidental or consequential damage which may be caused by the failure of delivered units.

Services Charges

- Prices of goods do not include any applicable service charges, such as the dispatching of engineers.
- Startup or maintenance services that require the dispatching of engineers are subject to payment even during the applicable warranty period.
- Service charges will be invoiced in accordance with the supplier's standard service charge list.

Discontinuation of Production and Maintenance Service Period

- Any discontinuation of production will be announced one year in advance. The maintenance service period is five (5) years after discontinuation of production. Announcement will be released by the supplier or published on the NSK Web site.

Special-purpose Applications

- This product is intended for general industrial applications and is not designed or manufactured for use under dangerous conditions.
- Contact NSK before using this product for any special-purpose applications, including nuclear power equipment and systems or aerospace, medical, and safety devices.
- While this product is manufactured under strict quality controls, NSK recommends that an appropriate safety device be installed when used with equipment that could cause serious accidents or damage in the event of product failure.



# 12 Form for Requesting Megatorque Motor Selection

NSK will assist in selecting the optimal Megatorque Motor. Please fill in the necessary items on the below form and send it by fax to the local NSK office.

Items marked with **○** represent the important information required for selection. Please provide as much detail as possible.

To be completed by customer

Example of completed form

To _____, in charge of Precision Machinery & Parts, NSK		Date (DD/MM/YYYY): / /	
○ Company Name: _____		○ Section: _____	
○ Name: _____		○ Contact: _____	
		TEL _____ FAX _____	
○ Application and equipment used (specify with as much detail as possible)			
○ Motor installation position (check in <input type="checkbox"/> )			
<input type="checkbox"/> Upright position <input type="checkbox"/> Horizontal position <input type="checkbox"/> Upside-down position <input type="checkbox"/> Others 			
○ Load conditions (1) Geometry, dimensions, thickness, material (or mass) of table (2) Dimensions, mass, quantity of loads/jigs (3) PCD (distance between the jigs/loads) (example of description)			
<p>Schematic drawing (an attached illustration showing outside dimensions is acceptable)</p> <ul style="list-style-type: none"> <li>Please provide information on outside dimensions, dimensions from the center, material, etc.</li> </ul> <p>Attachment: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>			
○ (4) External force (pressure/impact load, sliding friction, etc.)			
<p>_____ N    <input type="checkbox"/> None    <input type="checkbox"/> Always    <input type="checkbox"/> At settling    <input type="checkbox"/> During rotating    <input type="checkbox"/> Some impact</p> <p><input type="checkbox"/> Rotational direction    <input type="checkbox"/> Sliding friction</p> <p>*Specify position, direction, etc. in the schematic drawing.</p>			
Motor size requested			
Positioning command system <input type="checkbox"/> Internal program system <input type="checkbox"/> Pulse train input operation <input type="checkbox"/> RS-232C operation <input type="checkbox"/> CC-Link			
○ Index angle / Number of points    Settle at _____ °, Number of points: _____			
○ Repeatability (±)    ± _____ seconds (± _____ mm at _____ mm from the motor center)			
○ Cycle pattern (desired positioning time) *Specify settling time.			
○ Input power voltage <input type="checkbox"/> AC100-115V <input type="checkbox"/> AC200-230V <input type="checkbox"/> Others ( _____ V)			
Environmental conditions			
Operating environment <input type="checkbox"/> General environment (equivalent to IP30) <input type="checkbox"/> Oil, water and chemical <input type="checkbox"/> Oil, water and chemical <input type="checkbox"/> Chips and dust <input type="checkbox"/> Clean Operating temperature <input type="checkbox"/> 0°C to 40°C <input type="checkbox"/> Below 0°C <input type="checkbox"/> Above 40°C <input type="checkbox"/> Other ( _____ °C) Contact NSK for details.			
○ Cable specification and length <input type="checkbox"/> Fixed cable <input type="checkbox"/> Movable cable    Length: _____ m (standard: 2, 4, 8 m) Select "Movable" when cable is repeatedly bent anywhere along the wiring route.			
Other request items			

To Mr. XXX XXX, in charge of Precision Machinery & Parts, NSK		Date (DD/MM/YYYY): 12 / 01 / 2010	
○ Company Name: YYY Corporation		○ Section: Engineering Dept., Engineering Section #1	
○ Name: YYY YYY		○ Contact: _____	
		TEL 03-1234-5678-8    FAX 03-1234-5678	
○ Application and equipment used (specify with as much detail as possible)			
Semiconductor inspection machine			
○ Motor installation position (check in <input type="checkbox"/> )			
<input checked="" type="checkbox"/> Upright position <input type="checkbox"/> Horizontal position <input type="checkbox"/> Upside-down position <input type="checkbox"/> Others 			
○ Load conditions (1) Geometry, dimensions, thickness, material (or mass) of table (2) Dimensions, mass, quantity of loads/jigs (3) PCD (distance between the jigs/loads) (example of description)			
<p>Schematic drawing (an attached illustration showing outside dimensions is acceptable)</p> <ul style="list-style-type: none"> <li>Please provide information on outside dimensions, dimensions from the center, material, etc.</li> </ul> <p><b>Example of description</b></p> <ul style="list-style-type: none"> <li>Jig: Mass of 5 kg x 4</li> <li>PCD: 250 mm</li> <li>External force: None</li> </ul> <p>Attachment: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>			
○ (4) External force (pressure/impact load, sliding friction, etc.)			
<p>10 N    <input checked="" type="checkbox"/> None    <input type="checkbox"/> Always    <input type="checkbox"/> At settling    <input type="checkbox"/> During rotating    <input type="checkbox"/> Some impact</p> <p><input type="checkbox"/> Rotational direction    <input type="checkbox"/> Sliding friction</p> <p>Force is applied downward to a single point at 125 mm in radius from the center.</p> <p>*Specify position, direction, etc. in the schematic drawing.</p>			
Motor size requested			
M-PS3060			
Positioning command system <input checked="" type="checkbox"/> Internal program system <input type="checkbox"/> Pulse train input operation <input type="checkbox"/> RS-232C operation <input type="checkbox"/> CC-Link			
○ Index angle / Number of points    Settle at 90 °, Number of points: 4			
○ Repeatability (±)    ± 20.6 seconds (± 0.01 mm at 100 mm from the motor center)			
○ Cycle pattern (desired positioning time) *Specify settling time.			
○ Input power voltage <input type="checkbox"/> AC100-115V <input checked="" type="checkbox"/> AC200-230V <input type="checkbox"/> Others ( _____ V)			
Environmental conditions			
Operating environment <input checked="" type="checkbox"/> General environment (equivalent to IP30) <input type="checkbox"/> Oil, water and chemical <input type="checkbox"/> Oil, water and chemical <input type="checkbox"/> Chips and dust <input type="checkbox"/> Clean Operating temperature <input checked="" type="checkbox"/> 0°C to 40°C <input type="checkbox"/> Below 0°C <input type="checkbox"/> Above 40°C <input type="checkbox"/> Other ( _____ °C) Contact NSK for details.			
○ Cable specification and length <input type="checkbox"/> Fixed cable <input checked="" type="checkbox"/> Movable cable    Length: 4 m (standard: 2, 4, 8 m) Select "Movable" when cable is repeatedly bent anywhere along the wiring route.			
Other request items			
Please reply by January 12, 2010. (example)			

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