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MOTION & CONTROL

NSK

Megatorque Motor®

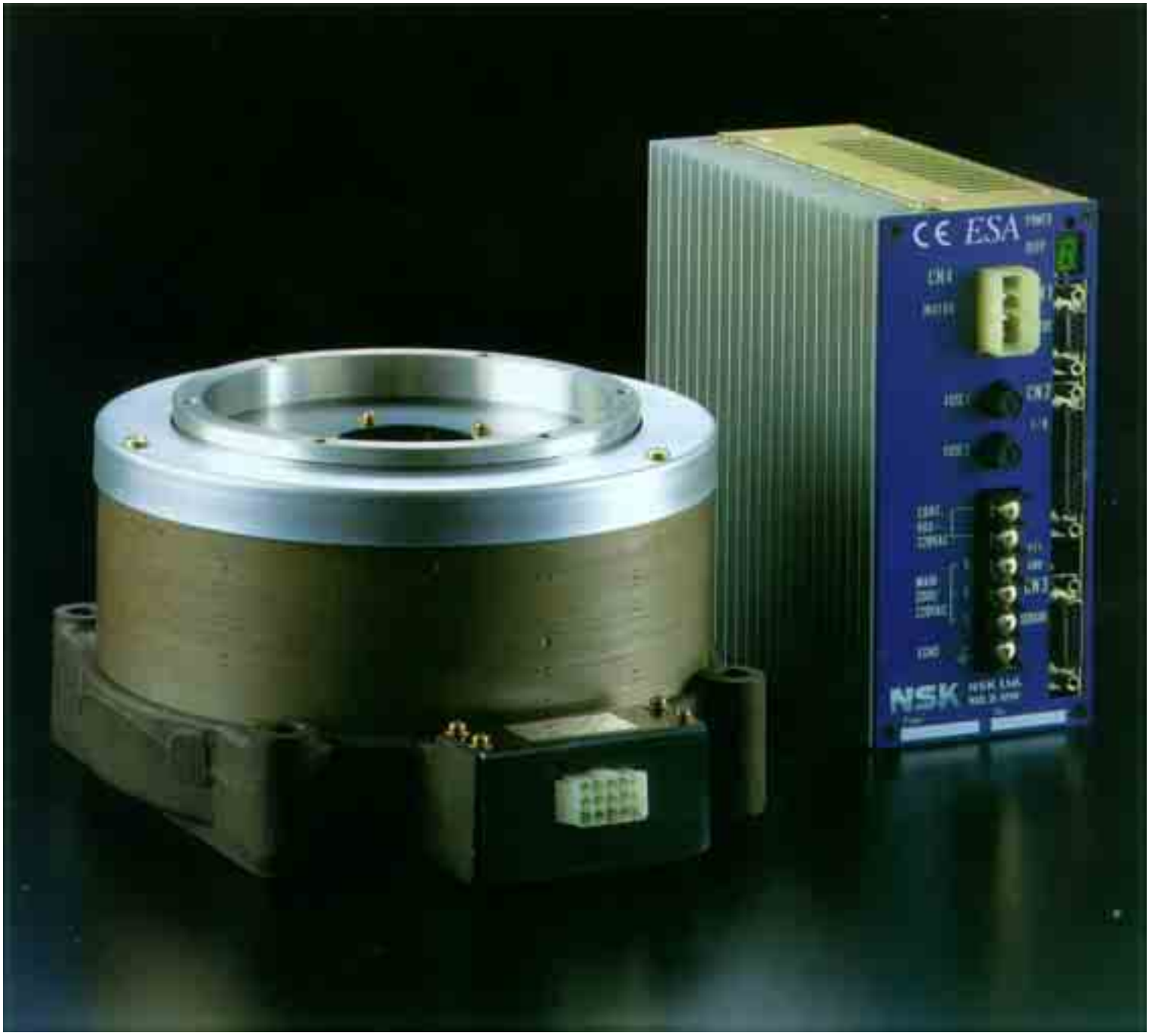
Direct Drive Motor YS Series

Conformity with CE Marking Directives

CE

Standard Inventory Available

New models to suit an even wider range of performance requirements



Megatorque Motor®

The YS Series

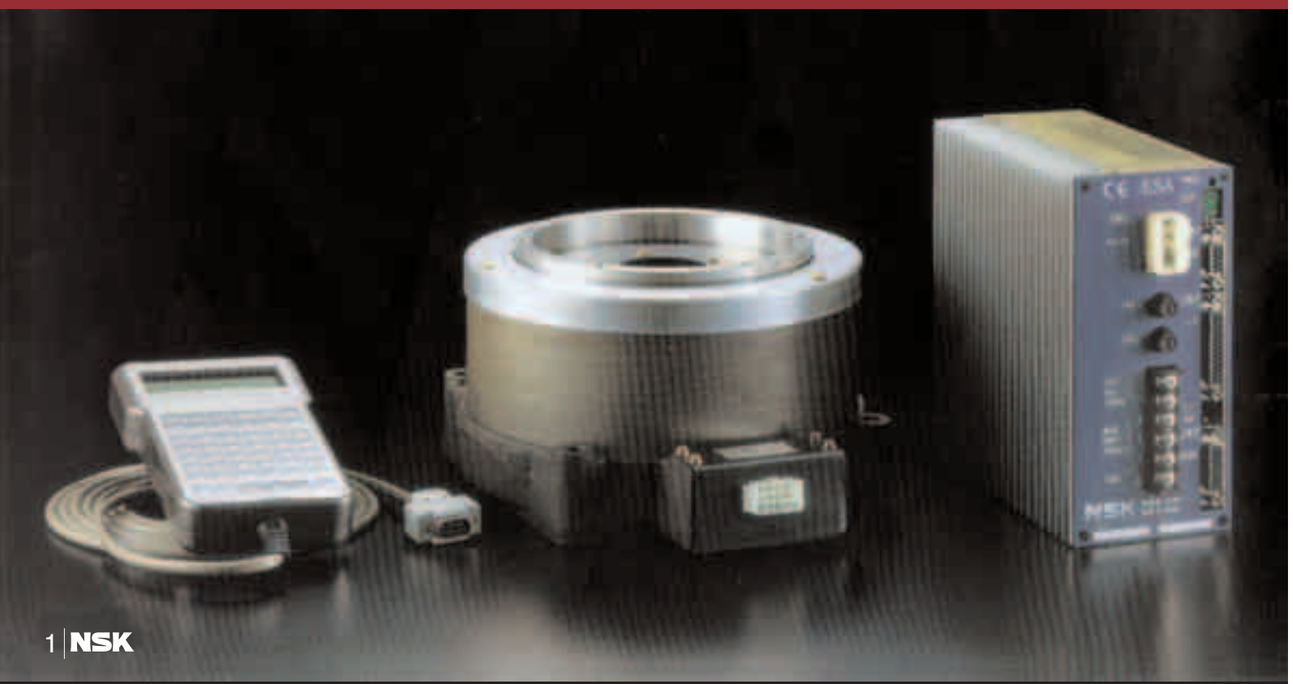
The NSK Megatorque Motor is a direct drive motor which achieves highly precise positioning with very high torque at low speed.

The YS Series combines the performance and reliability of the existing Megatorque Motor range with the advantages of compact size and simple design for low cost. In addition to five standard motors that cover a wide range of performance requirements while assuring low cost and short delivery times, NSK now offers special order motors featuring a low profile, knock-pin holes or a brake. All Megatorque Motors in the YS Series conform to European safety requirements and bear the CE Marking. A new analog command function had been added to the dedicated ESA25 Driver Unit.

The Megatorque Motor is suitable for a wide range of industrial applications, including use as a rotary actuator for robots, transfer systems, chamfering machines and printing machines or as a rotary indexer for assembly machines, welding systems, measuring instruments and machining centers.

The YS Series system combines NSK's technical excellence and reliability with outstanding performance and features including:

- simple motor structure and dedicated compact driver units for low cost
- standard stock for short delivery times
- interchangeability of motors, Driver Units and cable sets (lengths 2–30m)
- high resolution, full closed-loop control and zero backlash for high precision
- high load-capacity bearings
- max. torque 240 N•m
- max. speed 3 rps
- repeatability of ±2.1 sec
- hollow-core structure allowing wires and pipes to run inside the motor
- an auto-tuning function to eliminate the time-consuming task of gain adjustment
- conformity with CE Marking requirements

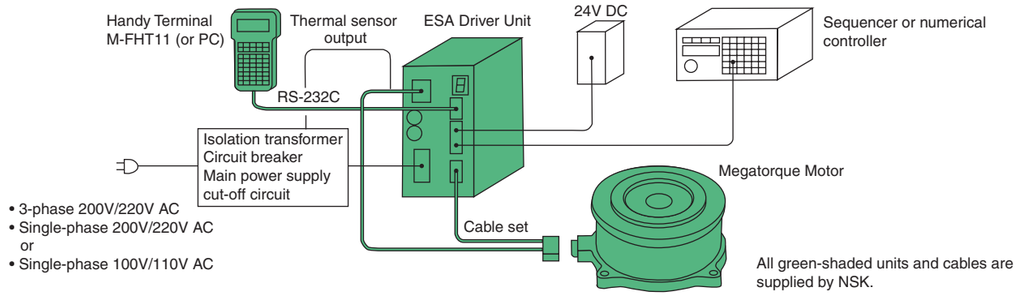


The NSK Megatorque Motor System

System Components

The typical Megatorque Motor system consists of a motor, a driver unit, a Handy Terminal (or PC) and cables. You will also need AC and DC power supplies, a sequencer (PLC) or numerical controller, isolation transformer, circuit breaker, main power supply cut-off circuit, and noise filters.

Schema of a Typical Megatorque Motor System



How to Use This Guide

Use this guide to select the motors, driver units and accessories you need for your application. Pages 3–23 describe the principal specifications and characteristics of each component in the motor system. On page 24 you will find notes on the CE Marking and precautions for using products bearing the CE Marking. Finally, pages 25–26 list all of the product numbers you will need to order a complete system.

If you have any questions, or would like more detailed information about any aspect of the Megatorque Motors' YS Series, please contact your NSK representative at one of our worldwide offices listed on the back cover.

Use the form on page 25 to order the right system for your application.

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Megatorque Motor®

Standard Type Motors & Motors with Knock-pin Holes

The NSK Megatorque Motor is a direct drive motor which eliminates all gears and other transmission mechanisms to achieve very high torque at low speeds. The YS Series offers five standard type motors, assuring low cost and short delivery times. Motors with knock-pin holes, motors with a brake and low-profile motors are also available.

The Megatorque Motors' YS Series features:

- high torque at low speed—up to 240 N•m
- repeatability of ±2.1 sec
- brushless structure and permanently lubricated heavy duty bearings for maintenance-free operation
- high axial and moment rigidity
- hollow-core structure allowing wires or pipes to run inside the motor

The YS Series offers five standard motors.

Principal Specifications

Five standard type motors and five motors with knock-pin holes in the YS Series

If your requirements differ from the standard specifications, please contact NSK.

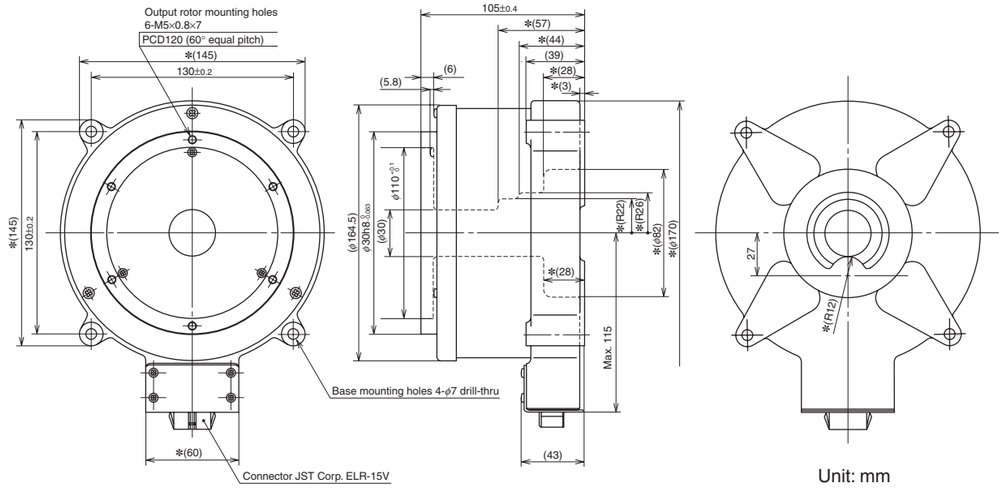
Standard type motors	M-YS2020GN001	M-YS3040GN501	M-YS4080GN001	M-YS5120GN001	M-YS5240GN001
Motors with knock-pin holes	M-YS2020GN011	M-YS3040GN511	M-YS4080GN011	M-YS5120GN011	M-YS5240GN011
Maximum torque(2) (N•m)	20	40	80	120	240
Maximum stall torque (N•m)	15	35	70	105	198
Maximum current/phase (A)			6		
Allowable axial load(3) (N)	3700	4500	9500	19600	19600
Allowable moment load(3) (N•m)	60	80	160	400	400
Axial rigidity(1) (mm/N)	4.0×10^{-6}	3.0×10^{-6}	1.4×10^{-6}	1.0×10^{-6}	1.0×10^{-6}
Moment rigidity(1) (rad/N•m)	3.5×10^{-6}	2.5×10^{-6}	1.5×10^{-6}	3.0×10^{-7}	3.0×10^{-7}
Rotor moment of inertia (kg•m²)	0.007	0.020	0.065	0.212	0.255
Rotor inertia GD2 (kgf•m²)	0.028	0.080	0.260	0.850	1.020
Mass(kg)	10	16	29	55	95
Operating conditions	Temperature: 0–40°C, Humidity: 20–80%		Use indoors, free from dust, condensation and corrosive gases		
Maximum speed [s^{-1}(rps)]			3		
Resolver resolution (p/rev)			614400		
Resolver accuracy (sec)			150		
Resolver repeatability (sec)			±2.1		
Compatible driver units(4)	M-ESA-Y2020T23	M-ESA-Y3040T23	M-ESA-Y4080T23	M-ESA-Y5120T23	M-ESA-Y5240T23
	M-ESA-Y2020V23	M-ESA-Y3040V23	M-ESA-Y4080V23	M-ESA-Y5120V23	
	M-ESA-Y2020T25	M-ESA-Y3040T25	M-ESA-Y4080T25	M-ESA-Y5120T25	M-ESA-Y5240T25
	M-ESA-Y2020V25	M-ESA-Y3040V25	M-ESA-Y4080V25	M-ESA-Y5120V25	

Notes:
SI unit system: 1N = 0.225 lb; 1N•m = 0.738 ft•lb
(1) These values assume that the motors is mounted on a rigid base.
(2) For speed-torque characteristics, see page 20.
(3) For details of how to calculate axial and moment loads, see page 21.
(4) For the compatible Driver Units, see pages 14–17.
Megatorque Motors' YS Series can be run on either 100/110V or 200/220V AC except M-YS5240GN∗∗∗.
M-YS5240∗∗∗is available only in 200/220V AC version.
For order numbers of compatible Driver Units, cables and other accessories, see pages 25–26.
(5) Please consult NSK if the application requires more than 2(s^{-1}) continuous revolutional speed in the same direction.

Motor Dimensions

The figures on pages 4–8 show the external dimensions of the five standard motors in the YS Series and the five motors with knock-pin holes. Please check that the motors you plan to order will fit your workspace specifications.

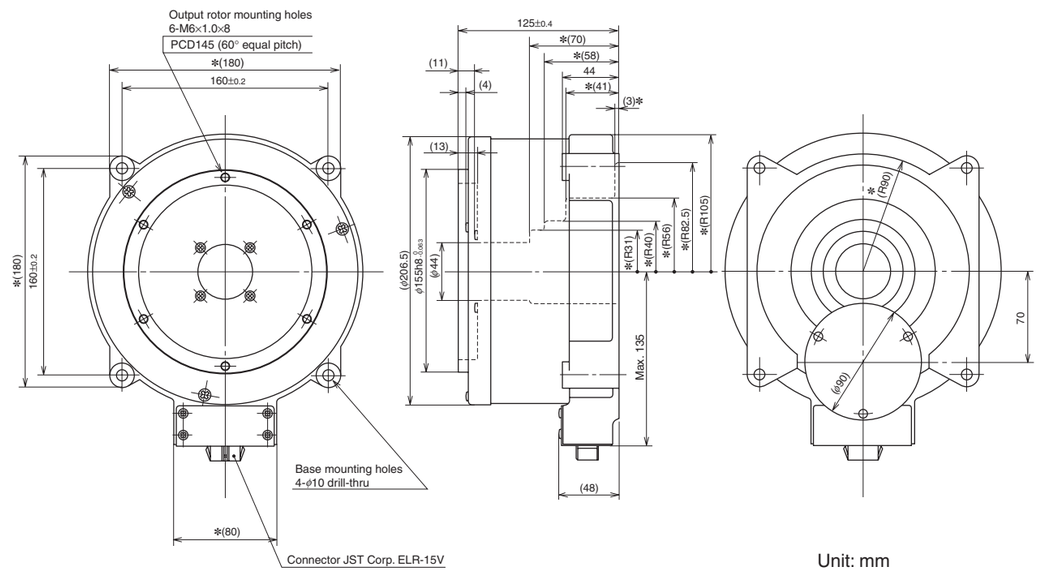
M-YS2020GN001 (standard type motor)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

M-YS3040GN501 (standard type motor)

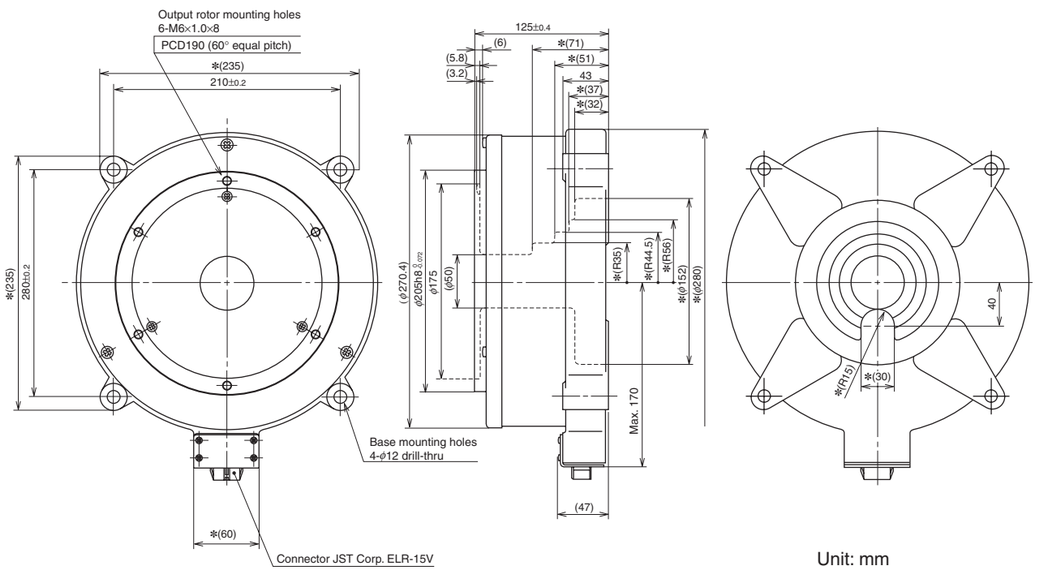


Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

Motor Dimensions

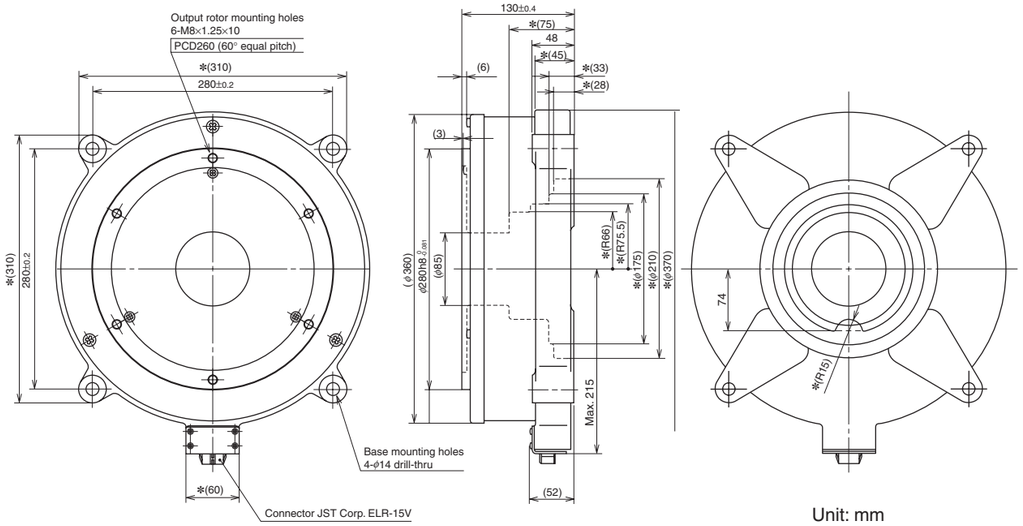
M-YS4080GN001 (standard type motor)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

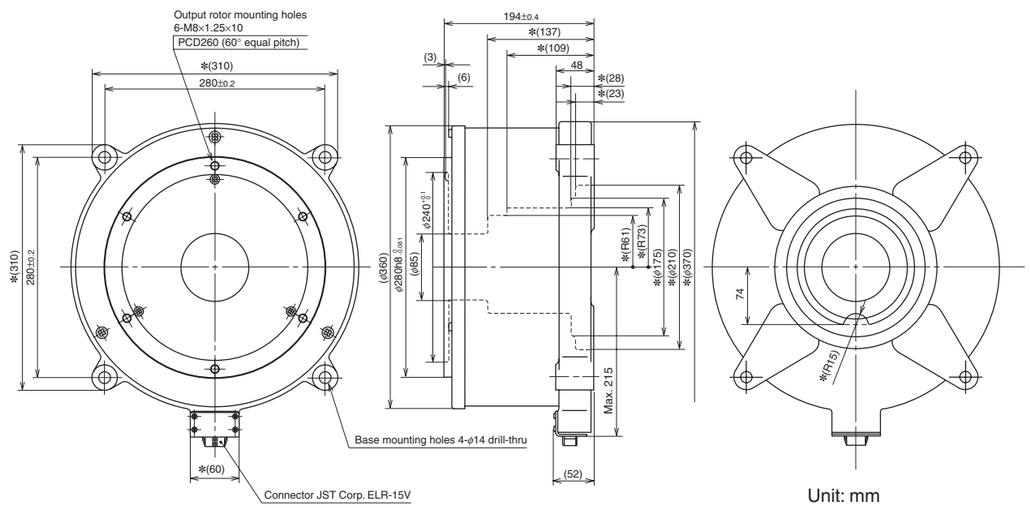
M-YS5120GN001 (standard type motor)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

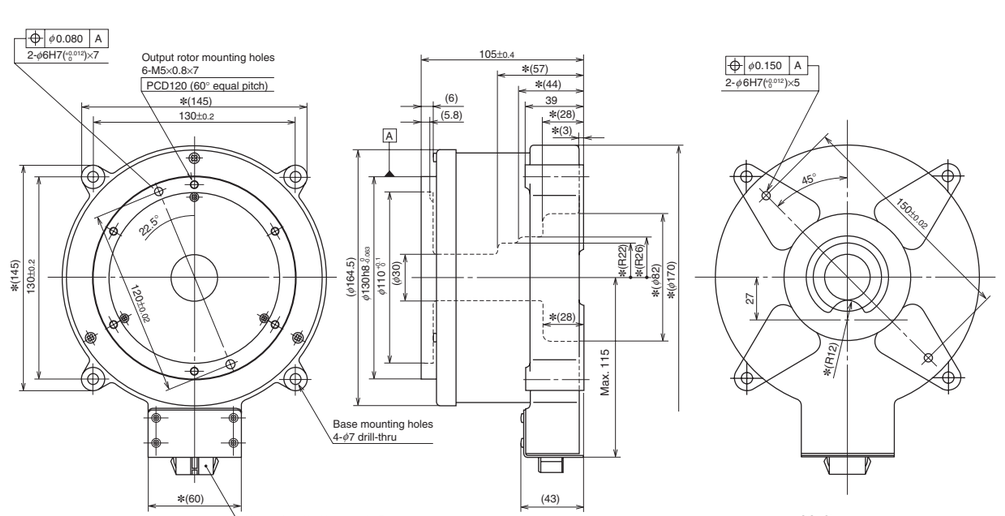
M-YS5240GN001 (standard type motor)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

M-YS2020GN011 (with knock-pin holes)

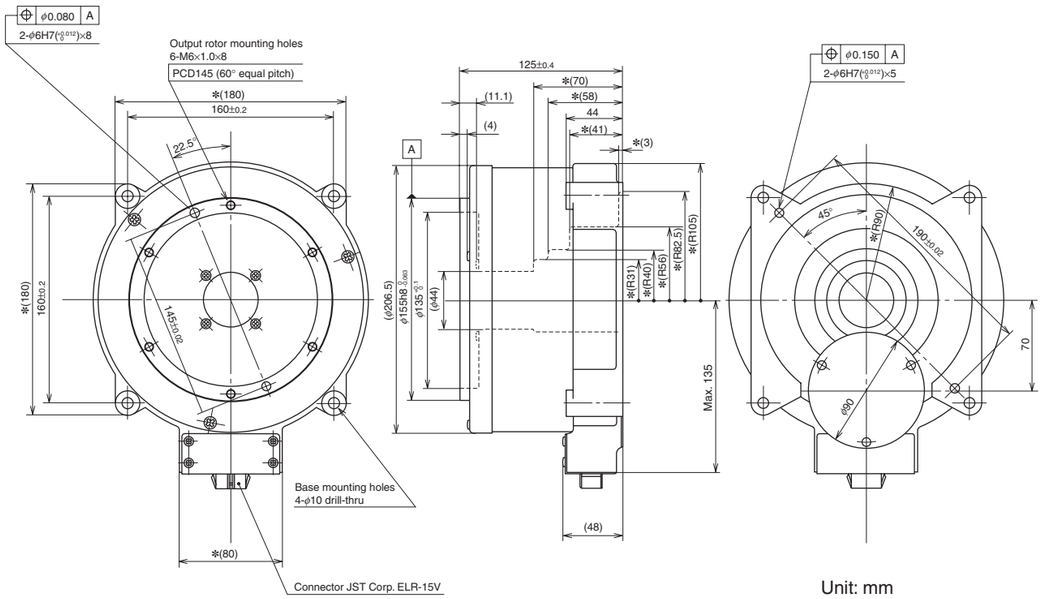


Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

Motor Dimensions

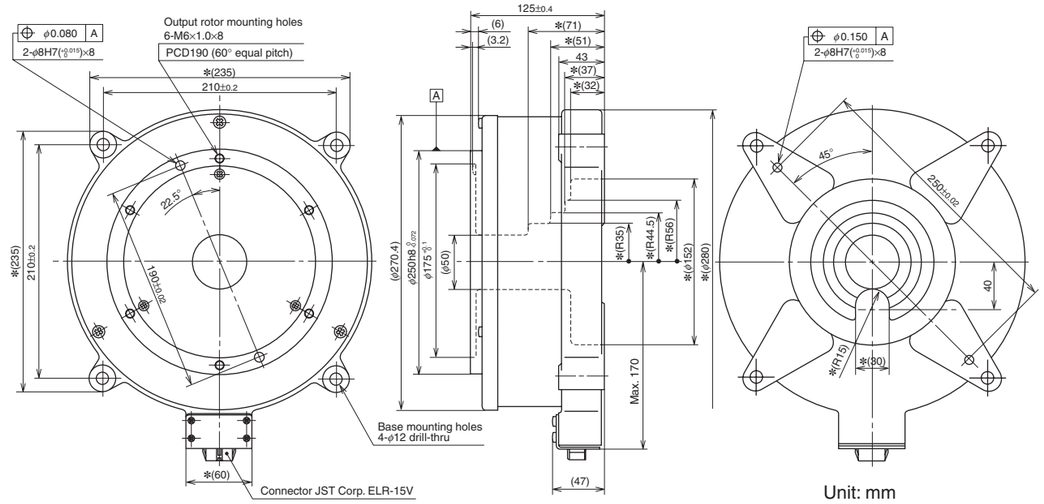
M-YS3040GN511 (with knock-pin holes)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

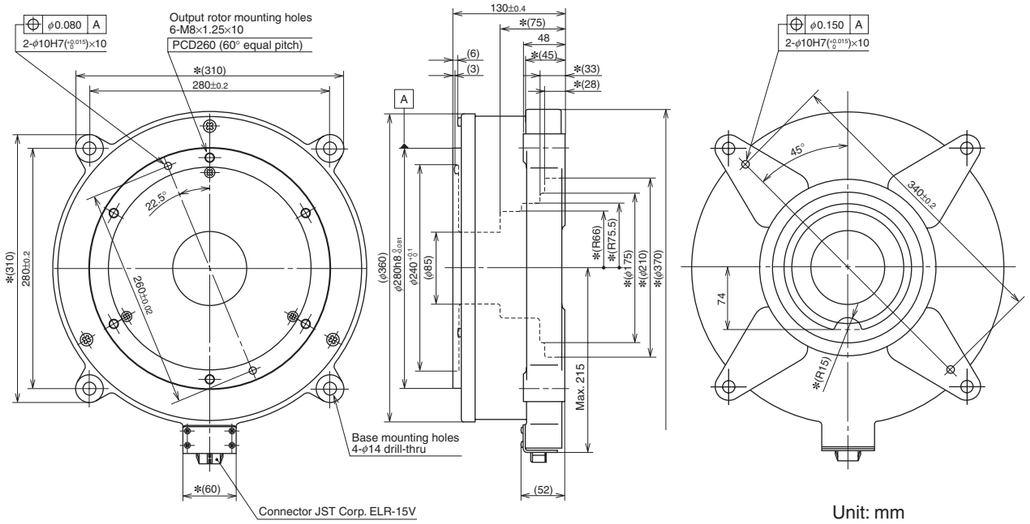
M-YS4080GN011 (with knock-pin holes)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

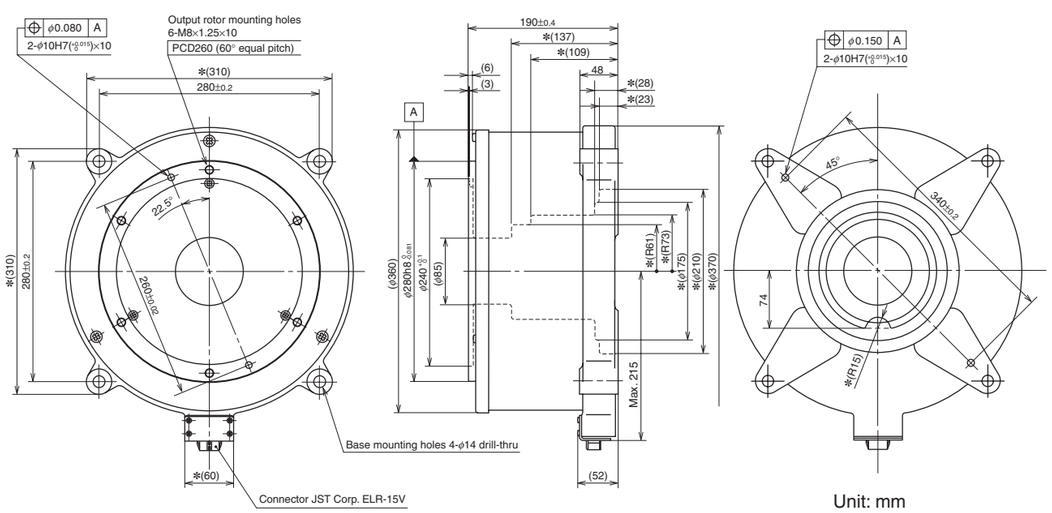
M-YS5120GN011 (with knock-pin holes)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

M-YS5240GN011 (with knock-pin holes)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

Motors with Brakes

The Megatorque Motors' YS Series includes four motors with an integral brake that is actuated by an external power supply.

For detail of brake power supply, see page 19.

Principal Specifications

Four motors with knock-pin holes in the YS Series

If your requirements differ from the standard specifications, please contact NSK.

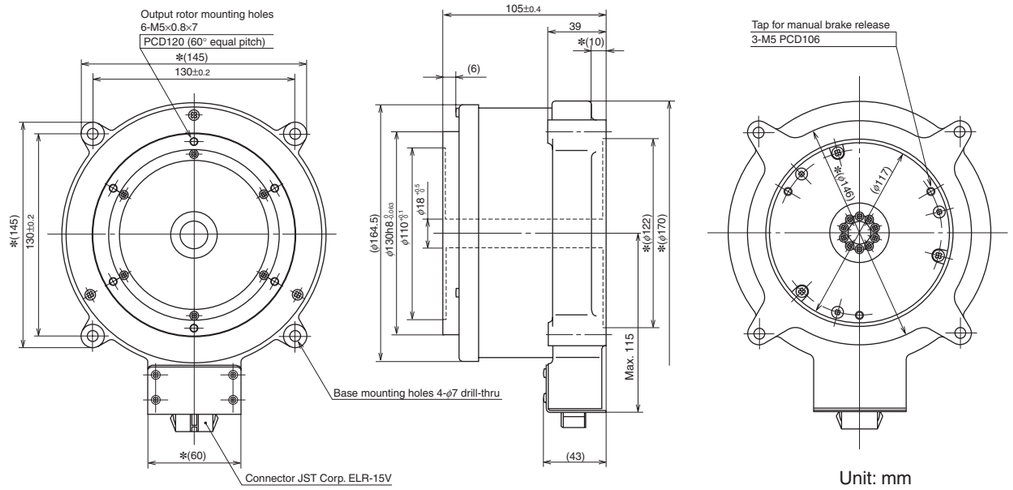
Motors with brakes	M-YS2020GG001	M-YS3040GG001	M-YS4080GG001	M-YS5120GG001
Maximum torque(2) (N•m)	20	40	80	120
Maximum stall torque (N•m)	15	35	70	105
Maximum current/phase (A)	6			
Allowable axial load(3) (N)	3700	4500	9500	19600
Allowable moment load(3) (N•m)	60	80	160	400
Axial rigidity(1) (mm/N)	4.0×10^{-6}	3.0×10^{-6}	1.4×10^{-6}	1.0×10^{-6}
Moment rigidity(1) (rad/N•m)	3.5×10^{-6}	2.5×10^{-6}	1.5×10^{-6}	3.0×10^{-7}
Rotor moment of inertia (kg•m²)	0.008	0.023	0.072	0.240
Rotor inertia GD² (kgf•m²)	0.032	0.092	0.288	0.960
Brake output torque (N•m)	20	40	80	120
Mass (kg)	12	20	36	66
Operating conditions	Temperature: 0–40°C, Humidity: 20–80%	Use indoors, free from oil mist, dust, condensation and corrosive gases.		
Maximum speed [s^{-1}(rps)]	3			
Resolver resolution (p/rev)	614400			
Resolver accuracy (sec)	150			
Resolver repeatability (sec)	±2.1			
Compatible driver units(4)	M-ESA-Y2020T25	M-ESA-Y3040T25	M-ESA-Y4080T25	M-ESA-Y5120T25
	M-ESA-Y2020V25	M-ESA-Y3040V25	M-ESA-Y4080V25	M-ESA-Y5120V25

Notes:
SI unit system: 1N = 0.225 lb; 1N•m = 0.738 ft•lb
(1) These values assume that the motor is mounted on a rigid base.
(2) For speed-torque characteristics, see page 20.
(3) For details of how to calculate axial and moment loads, see page 21.
(4) For the compatible Driver Units, see pages 14–17.
Megatorque Motors' YS Series can be run on either 200/220V or 100/110V AC.
For order numbers of compatible Driver Units, cables and other accessories, see pages 25–26.
(5) Please consult NSK if the application requires more than 2(s^{-1}) continuous revolutional speed in the same direction.

Motor Dimensions

The figures on pages 10–11 show the external dimensions of the four motors in the YS Series with an integral brake. Please check that the motors you plan to order will fit your workspace specifications.

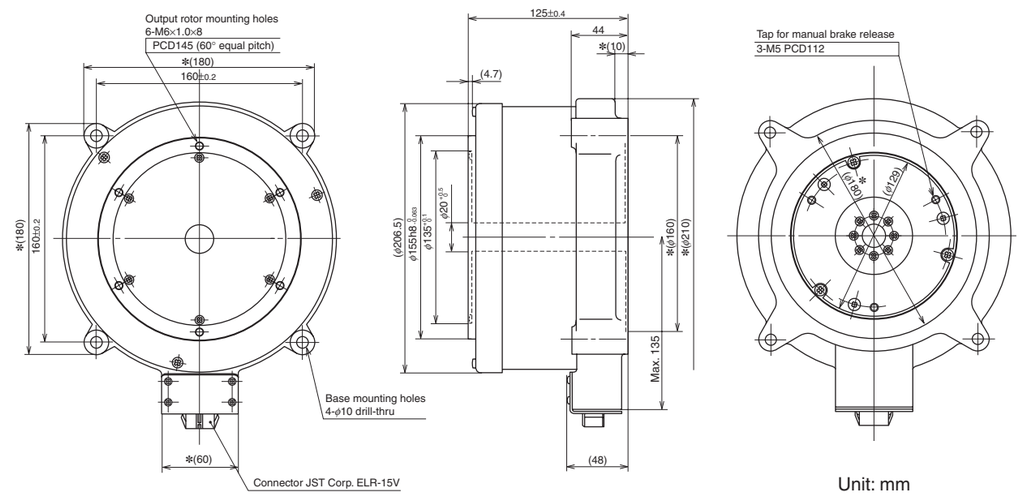
M-YS2020GG001 (with brake)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

M-YS3040GG001 (with brake)

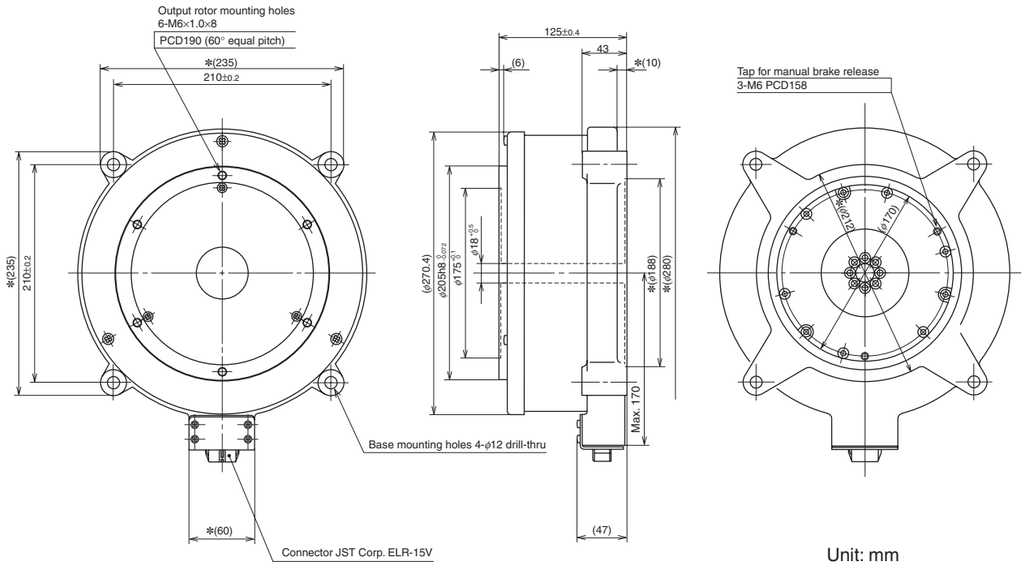


Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

Motor Dimensions

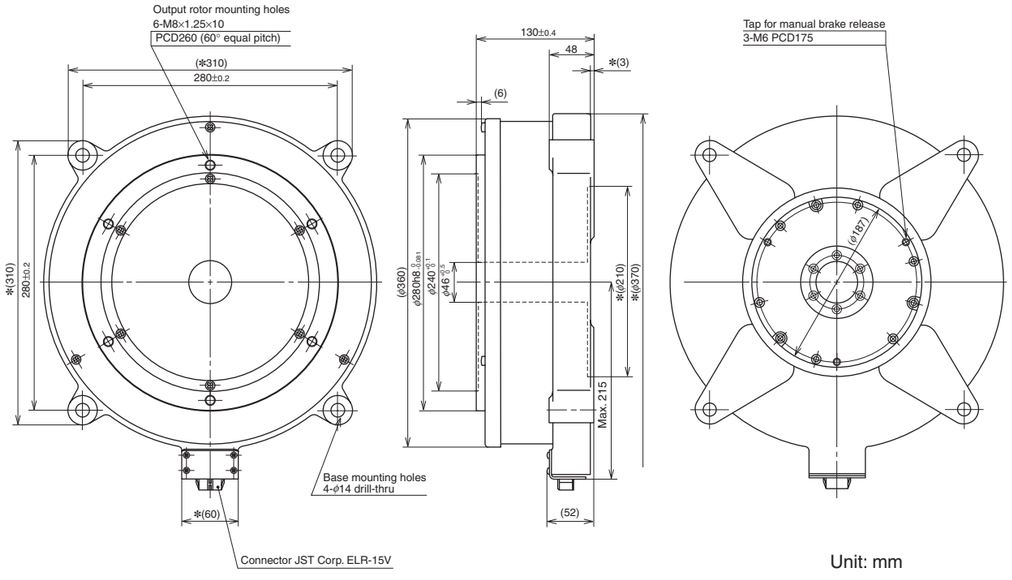
M-YS4080GG001 (with brake)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

M-YS5120G001 (with brake)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

Low-profile Motors

The Megatorque Motors' YS Series includes two motors with an extra-low profile for use in conditions where space is at a premium.

Principal Specifications

The two low-profile motors in the YS Series

If your requirements differ from the standard specifications, please contact NSK.

Low-profile motors	M-YS2005GN001	M-YS3008GN001
Maximum torque(2) (N•m)	5	8
Maximum stall torque (N•m)	4	5
Maximum current/phase (A)	1.5	
Allowable axial load(3) (N)	3700	4500
Allowable moment load(3) (N•m)	60	80
Axial rigidity(1) (mm/N)	2.8×10^{-5}	2.6×10^{-5}
Moment rigidity(1) (rad/N•m)	1.8×10^{-5}	1.5×10^{-5}
Rotor moment of inertia (kg•m²)	0.003	0.006
Rotor inertia GD2 (kgf•m²)	0.012	0.024
Mass (kg)	4	6
Operating conditions	Temperature: 0–40°C, Humidity: 20–80% Use indoors, free from dust, condensation and corrosive gases	
Maximum speed [s^{-1}(rps)]	3	2(5)/3(6)
Resolver resolution (p/rev)	614400	
Resolver accuracy (sec)	150	
Resolver repeatability (sec)	±2.1	
Compatible driver units(4)	M-ESA-Y2005T23	M-ESA-Y3008T23
	M-ESA-Y2005V23	M-ESA-Y3008V23
	M-ESA-Y2005T25	M-ESA-Y3008T25
	M-ESA-Y2005V25	M-ESA-Y3008V25

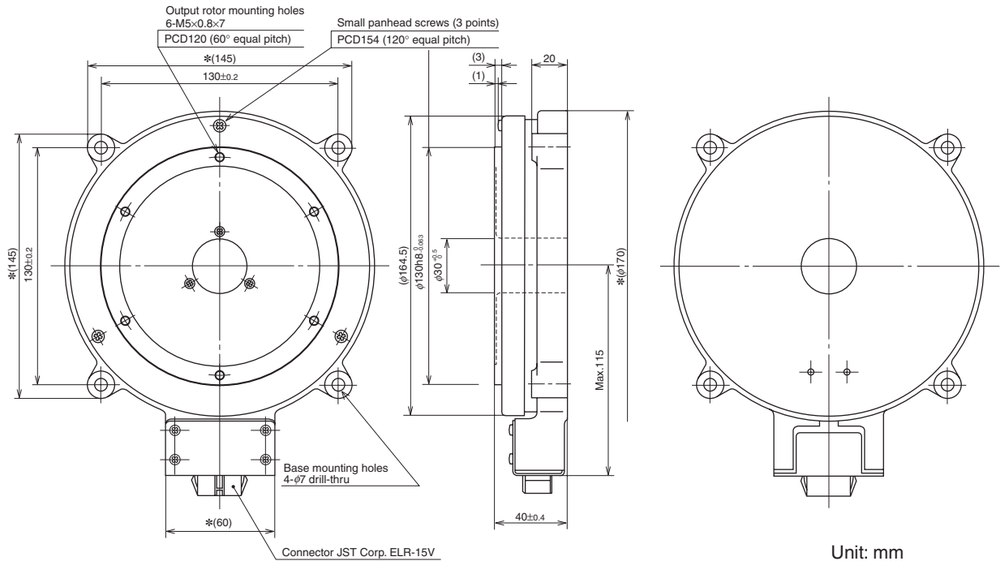
Notes:
SI unit system: 1N = 0.225 lb; 1N•m = 0.738 ft•lb
(1) These values assume that the motor is mounted on a rigid base.
(2) For speed-torque characteristics, see page 20.
(3) For details of how to calculate axial and moment loads, see page 21.
(4) For the compatible Driver Units, see pages 14–17.
(5) On 100/110V AC
(6) On 200/220V AC
Megatorque Motors' YS Series can be run on either 200/220V or 100/110V AC.
For order numbers of compatible Driver Units, cables and other accessories, see pages 25–26.
(7) Please consult NSK if the application requires more than 2(s^{-1}) continuous revolutional speed in the same direction.

Megatorque Motor®

Motor Dimension

The figures on this page show the external dimensions of the two low-profile motor in the YS Series. Please check that the motors you plan to order will fit your workspace specifications.

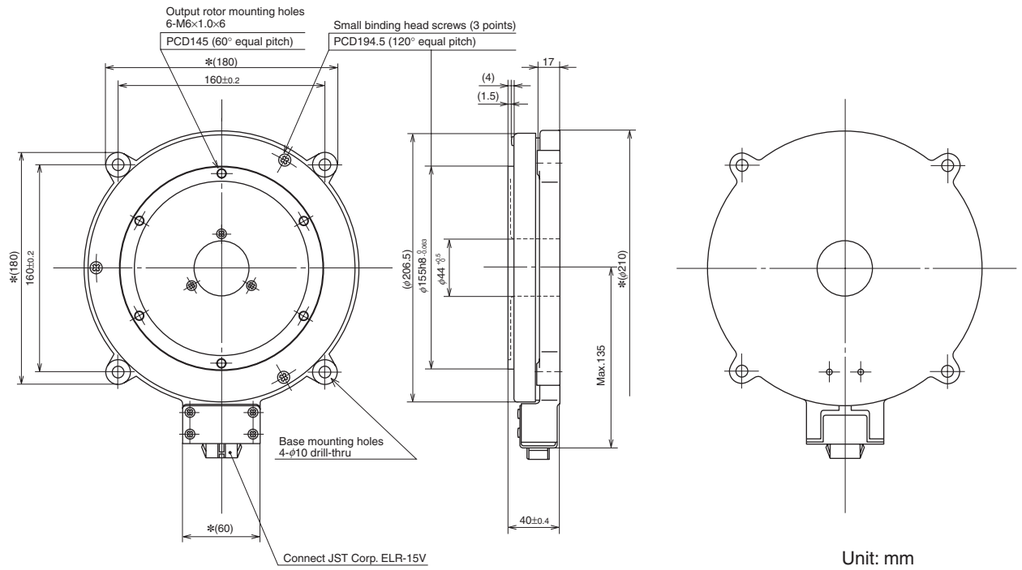
M-YS2005GN001 (low-profile)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

M-YS3008GN001 (low-profile)



Unit: mm

For dimensions marked ∗, an extra 2–3 mm allowance is required for your workspace due to their variations.

ESA Driver Units

The compact low-cost ESA Driver Units are specially designed for use with YS and Megatorque Motors' YS Series. They feature a built-in auto-tuning function to eliminate the time-consuming task of gain compensation and a new analog speed or torque command function.

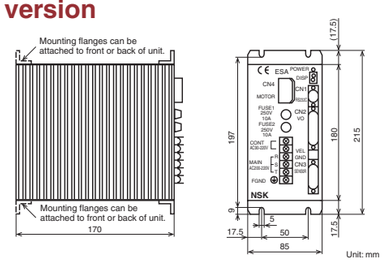
There are seven basic ESA Driver Units, one to suit the maximum torque of each size of Megatorque Motor. Each is available in two version, the ESA23 version having a wider range of functions than the ESA23 version, and available in either 100/110V or 200/220V AC types (except for the M-ESA-Y5240 models which run only on 200/220V), giving a total of 26 standard models (see table below).

When ordering, please specify the power supply and motor model you plan to use as some Driver Units may be incompatible with some motors.

Driver Unit Dimensions

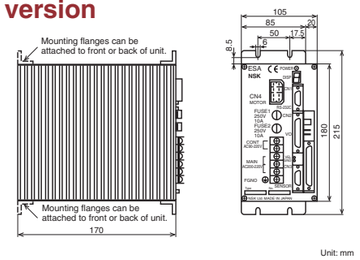
These figures show the external dimensions of the ESA Driver Units.

ESA23 version



Unit: mm

ESA25 version



Unit: mm

Principal Specifications

The twenty-six standard models of ESA Driver Units

If your requirements differ from the standard specifications, please contact NSK.

Driver unit reference number		ESA23 models	ESA25 models	ESA23 models	ESA25 models
		M-ESA-Y2005T23	M-ESA-Y2005T25	M-ESA-Y2005V23	M-ESA-Y2005V25
		M-ESA-Y3008T23	M-ESA-Y3008T25	M-ESA-Y3008V23	M-ESA-Y3008V25
		M-ESA-Y2020T23	M-ESA-Y2020T25	M-ESA-Y2020V23	M-ESA-Y2020V25
		M-ESA-Y3040T23	M-ESA-Y3040T25	M-ESA-Y3040V23	M-ESA-Y3040V25
		M-ESA-Y4080T23	M-ESA-Y4080T25	M-ESA-Y4080V23	M-ESA-Y4080V25
		M-ESA-Y5120T23	M-ESA-Y5120T25	M-ESA-Y5120V23	M-ESA-Y5120V25
		M-ESA-Y5240T23	M-ESA-Y5240T25		
Power supply voltage		200V or 220V AC, 50/60 Hz single-phase or 3-phase		100V or 110V AC, 50/60 Hz	
Power capacity		Depends on motor size			
Mass		2.2 kg (ESA23 models) / 3 kg (ESA25 models)			
Operating conditions		Temperature: 0–50°C, Humidity: 20–90% Use indoors, free from dust, condensation and corrosive gases			
Positioning command formats		Internal program drive; Pulse train input drive; RS-232C communications drive			
Pulse train input		Maximum input frequency 614.4 Kpps; Input pulse format: CW/CCW(1)			
Input signals	ESA23 models	Emergency stop, servo on, internal program select (max. 16 steps(2)), home limit switch, start			
	ESA25 models	Emergency stop, servo on, internal program select (max. 64 steps), home limit switch, home return start, analog command (±10V DC), integration control off, gain reduction, jog operation, overtravel			
Output signal	Position feedback	Output signal format: line driver (in Z-phase can only be switched to open collector)			
	Control output	Driver Unit ready, in position			
Alarm functions		Excess position error, software thermal, overtravel, controller error, resolver error, motor overcurrent, hear sink overheat, main circuit voltage error, control circuit low voltage			
Monitor functions		Analog speed monitor, alarm status, RS-232C communications monitor (parameters, program contents, position data, alarm messages)			
Communications		Serial RS-232C communications, transmission speed: 9600 bps			
Other		Automatic gain compensator (auto-tuning) function using RS-232C communications commands			

Notes: (1) Input pulse format can be switched from CW/CCW to pulse/direction or to A-phase/B-phase.
(2) Part of the internal program select input can be modified to provide jog, travel limit input, clear alarm input or home return start.

ESA23 Driver Unit

Input and Output Signals for CN2

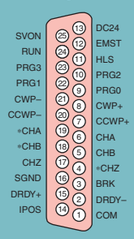
	Code	Pin No.	Name	Purpose
Input signals	CWP+	8	CW pulse train (+)	Turns rotor clockwise(1) using a pulse train
	CWP–	21	CW pulse train (–)	(Either pulse train or A-phase can be selected)
	CCWP+	7	CCW pulse train (+)	Turns rotor counterclockwise(1) using a pulse train
	CCWP–	20	CCW pulse train (–)	(Either pulse train or B-phase can be selected)
	EMST	12	Emergency stop	stop the motor and locks the servo
	SVON	25	Servo on	Turns the servo on
	PRG0	9	Program/channel select 0(2)	
	PRG1	22	Program/channel select 1(2)	In combination, internal program/channel selections 0–3 allow selection of
	PRG2	10	Program/channel select 2(2)	0–15 execution channels
	PRG3	23	Program/channel select 3(2)	
	HLS	11	Home limit switch	Completes the return home operation
	RUN	24	Start	Starts the selected channel
	DC24	13	24V DC external supply	External power supply for input signals (24V DC, 0.2A or more)
Output signals	CHA	6	Position feedback signal A-phase	
	CHB	5	Position feedback signal B-phase	
	CHZ	17	Z-phase/Digital position signal MSB	Pulse position line driver output signals for position feedback
	*CHA	19	Position feedback signal A-phase	Z-phase signal can only be switched to open collector
	*CHB	18	Position feedback signal B-phase	
	*CHZ	4	Z-phase/Digital position signal MSB	
	SGND	16	Signal ground	Ground for position feedback signals
	COM	1	Output signal common	Common signal for in position and brake control
	DRDY+	15	Driver Unit ready (+)	When closed, signal that Driver Unit is ready for commands
	DRDY–	2	Driver Unit ready (–)	(Open if Driver Unit is not ready and during alarms)
	IPOS	14	In position	When closed, signals that positioning has been completed
	BRK	3	Brake	Normally closed to release brake

Notes:
(1) Direction as seen from the output rotor.
(2) These four signals can be changed to the functions shown in the four tables on the right by selecting the parameter setting code via the Handy Terminal.

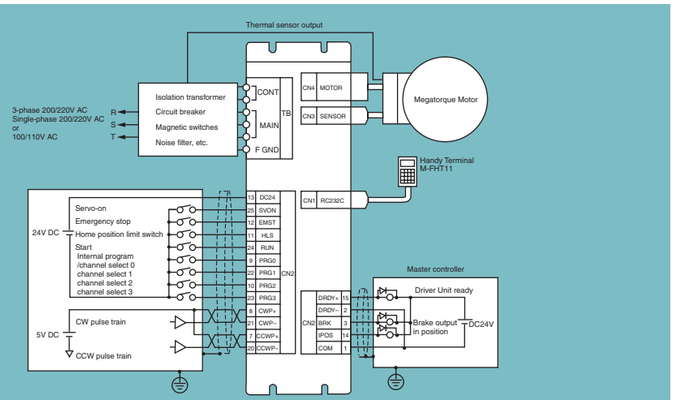
Code	Pin No.	Name	Purpose
JOG	9	Jog drive	Starts jog drive
DIR	22	Rotation direction indicator	Sets jog drive direction
OTP	9	Overtravel limit (+)	Overtravel signal in clockwise direction
OTM	22	Overtravel limit (–)	Overtravel signal in counterclockwise direction
CLR	10	Clear	Clears alarms and the positioning deviation counter
HOS	23	Home return start	Starts home return
JOG	10	Jog drive	Starts jog drive
DIR	23	Rotation direction indicator	Sets jog drive direction

Pin Arrangement and System Wiring Diagram

CN2 pin arrangement



Dsub 25 pins
A set of CN2 connectors is provided with the ESA Driver Unit.



The brake output signal is intended to control the brake. Do not use it as the power supply.
You can connect the CN2 or CN5 pins to suit the requirements of your application.

ESA25 Driver Unit

Input and Output Signals for CN2

	Code	Pin No.	Name	Purpose
Input signals	CWP+	8	CW pulse train (+)	Turns rotor clockwise(1) using a pulse train
	CWP–	21	CW pulse train (–)	(Either pulse train or A-phase can be selected)
	CCWP+	7	CCW pulse train (+)	Turns rotor counterclockwise(1) using a pulse train
	CCWP–	20	CCW pulse train (–)	Stops the motor and locks the servo
	EMST	12	Emergency stop	(Either pulse train or B-phase can be selected)
	SVON	25	Servo on	Turns the servo on
	HOS	23	Home return start	Initiates return home and start function
	HLS	11	Home limit switch	Limit switch for home return operation
	CLR	10	Clear input	Clears alarms and the positioning deviation counter
	IOFF	24	Integration control off	Switches integral and gain reduction on and off
	OTP	9	Overtravel limit (+)	Overtravel signal in clockwise direction
	OTM	22	Overtravel limit (–)	Overtravel signal in counterclockwise direction
	DC24	13	24V DC external supply	External power supply for input signals (24V DC, 0.2A or more)
Output signals	CHA	6	Position feedback signal A-phase	
	CHB	5	Position feedback signal B-phase	
	CHZ	17	Z-phase/Digital position signal MSB	Pulse position line driver output signals for position feedback
	*CHA	19	Position feedback signal A-phase	Z-phase signal can only be switched to open collector
	*CHB	18	Position feedback signal B-phase	
	*CHZ	4	Z-phase/Digital position signal MSB	
	SGND	16	Signal ground	Ground for position feedback signals
	COM	1	Output signal common	Common signal for in position and brake control
	DRDY+	15	Driver Unit ready (+)	When closed, signals that Driver Unit is ready for commands
	DRDY–	2	Driver Unit ready (–)	(Open if Driver Unit is not ready and during alarms)
	IPOS	14	In position	When closed, signals that positioning has been completed
	BRK	3	Brake	Normally closed to release brake

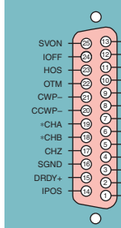
Note:
(1) Direction as seen from the output rotor.

Input and Output Signals for CN5

	Code	Pin No.	Name	Purpose
Input signals	DC24	19	24V DC external supply	External power supply for input signals (24V DC, 0.2A or more)
	RUN	17	Starts	Starts the selected channel
	PRG0	11	Program/channel select 0	
	PRG1	12	Program/channel select 1	
	PRG2	13	Program/channel select 2	In combination, internal program/channel selections 0–5 allow selection of 0–63 execution channels
	PRG3	14	Program/channel select 3	
	PRG4	15	Program/channel select 4	
	PRG5	16	Program/channel select 5	
	JOG	30	Jog drive	Starts jog drive
	DIR	31	Direction command	Sets direction of jog drive
	AIN+	8	Analog command input	These two terminals are used when analog input is selected in speed or torque modes
	AIN–	7	Analog input ground	
Output signals	MON+	27	Monitor output	
	MON–	26	Monitor ground	Output terminals for monitor operation
	HOME	21	Home return complete	
	COM	1	Output signal common	

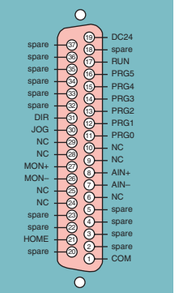
Pin Arrangement

CN2 pin arrangement



Dsub 25 pins
A set of CN2 connectors is provided with the ESA Driver Unit.

CN5 pin arrangement

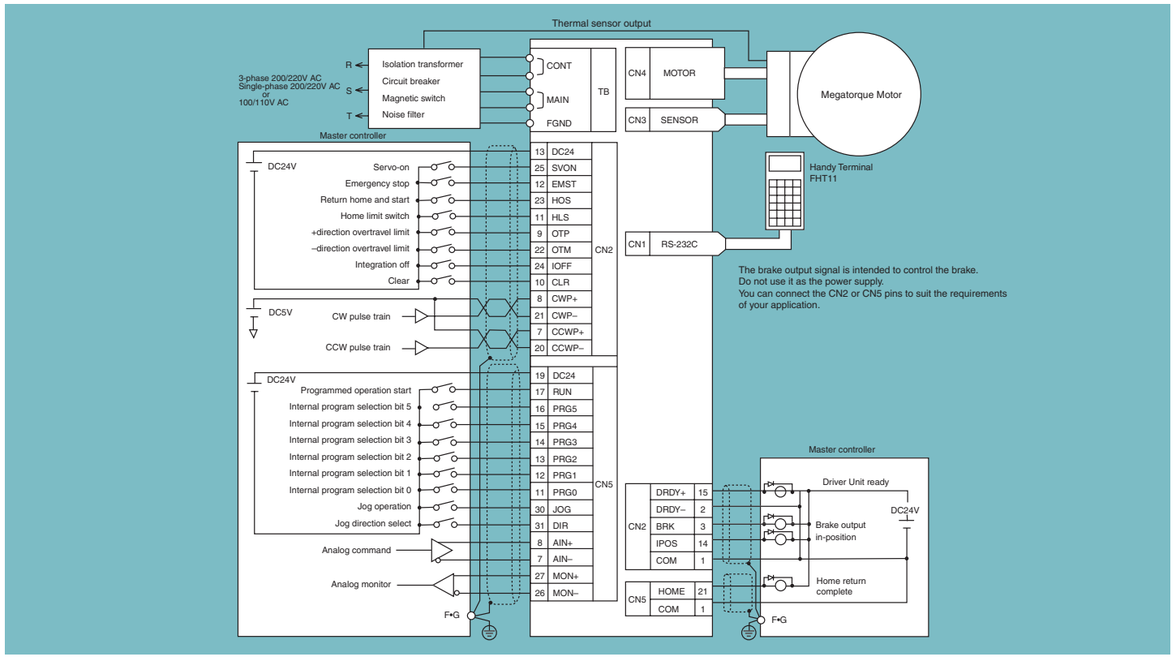


Dsub 37 pins
A set of CN5 connectors is provided with the ESA Driver Unit.

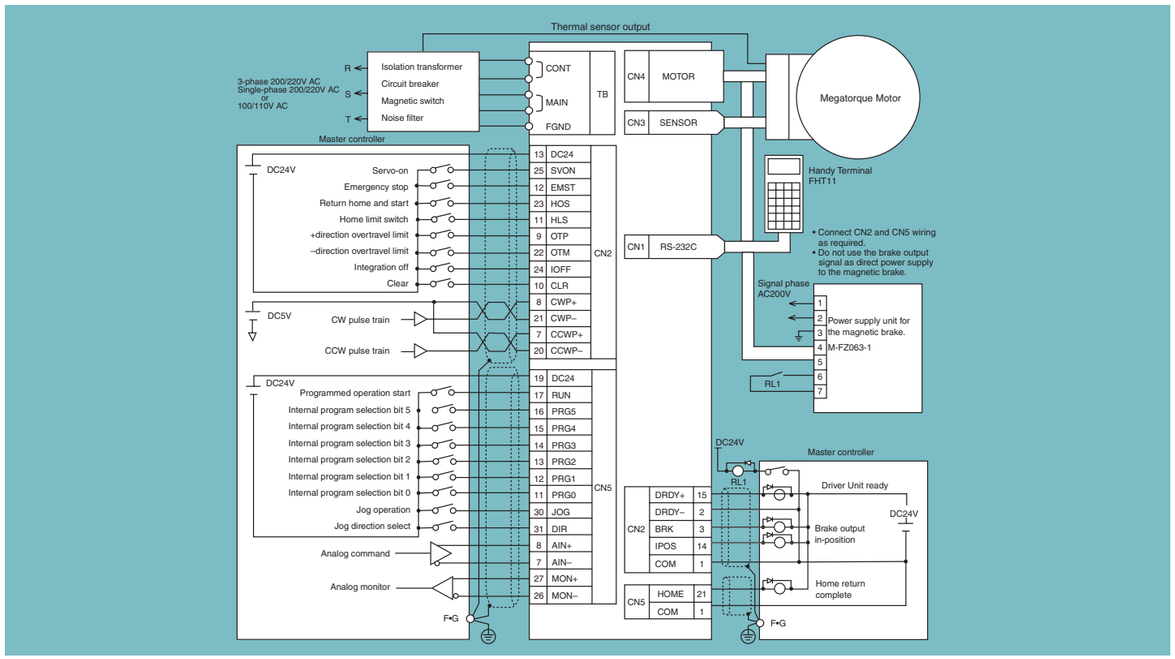
ESA Driver Units

System Wiring Diagrams

ESA25 Driver Units (without brake)



ESA25 Driver Units (with brake)



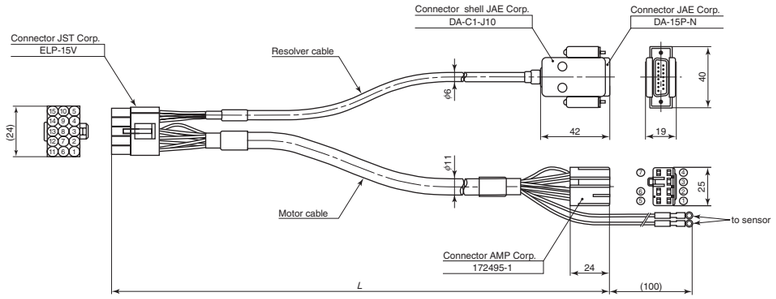
Accessories



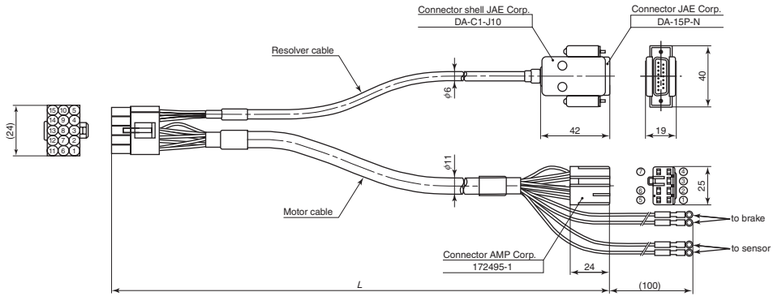
Motor and Driver Unit Cable Set

The motor and driver cable set is made of NSK's special Robot Cable, which will stand up to repeated bending.
Please note that motors with a brake need a special cable (see table and diagrams below).

Cables are available in standard lengths of 2, 4, 8, 15 and 30 meters.



Cable set (for standard, knock-pin hole, low-profile motors)



Cable set (for motors with brake)

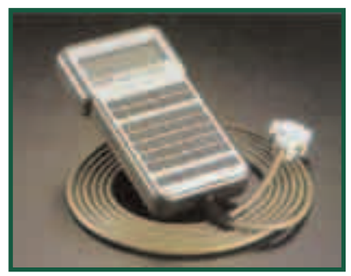
Length of standard cable sets

Cable sets for motors without brakes	Cable sets for motors with brakes	Cable length
M-C002SS29	M-C002SS28	2m
M-C004SS29	M-C004SS28	4m
M-C008SS29	M-C008SS28	8m
M-C015SS29	M-C015SS28	15m
M-C030SS29	M-C030SS28	30m

Handy Terminal

When setting up a Megatorque Motor system for the first time or if the motor is not connected to a personal computer, you will need a Handy Terminal to input parameters and programs. The Handy Terminal uses an RS-232C interface.

Order number M-FHT11



Accessories

Brake Power Supply (M-FZ063-1)

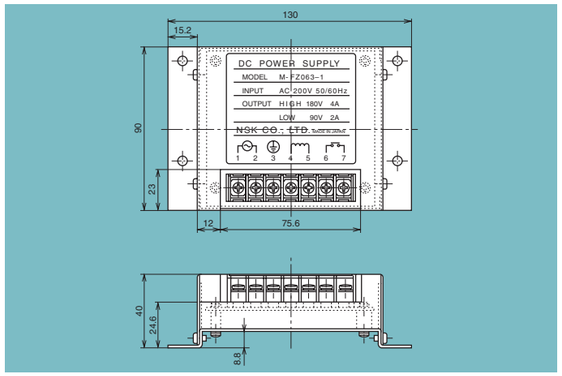
The M-FZ063 brake power supply is specially designed for use with the YS Series motors with a brake. The power supply is of the overexcitation type, allowing it to be switched between full- and half-wave settings (overexcitation, full-wave rectification, retention, half-wave). It conforms to CE safety requirements.



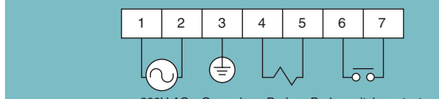
Specifications of the Brake Power Supply

Input voltage	200/220V AC, 50/60 Hz
Output voltage	180V DC, 4A (overexcitation) 90V DC, 2A (rated)
Overexcitation time	0.35 seconds
Mass	0.3 kg

Dimensions of Brake Power Supply



Connecting the Terminals

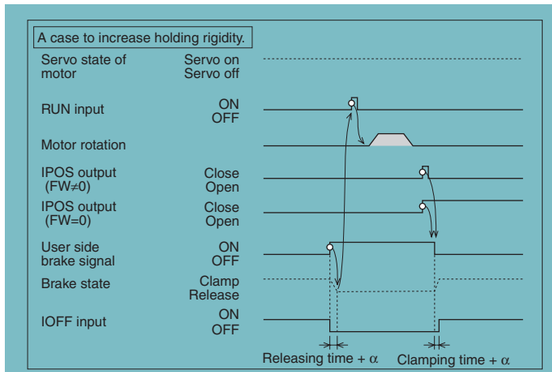


Important: The brake output of the ESA Driver Units cannot be used directly to switch the brake on or off. Please use an external brake switch contact for this purpose.
The capacity of the brake switch contacts must be at least 10 times that of the inductive load current at 180V DC.
Do not short out terminal 4 and 5 while the power is switched on.
Always switch the brake on and off using terminals 6 and 7.
Never short out terminals 6 and 7 and switch the brake on and off using the AC side.

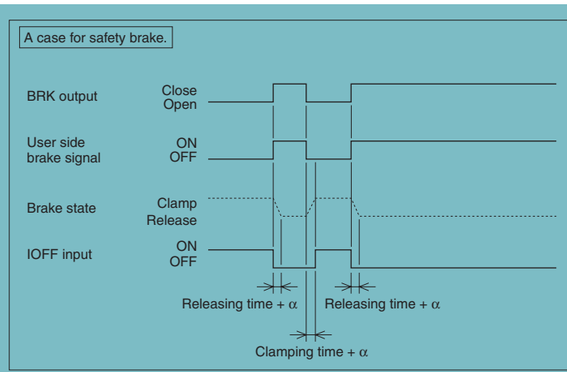
Motor No.s starting	M-YS2020	M-YS3040	M-YS4080	M-YS5120
Inductive load current (A)	0.36	0.50	0.66	0.72

Recommended Sequence Diagram

A case to increase holding rigidity.



A case for safety brake.



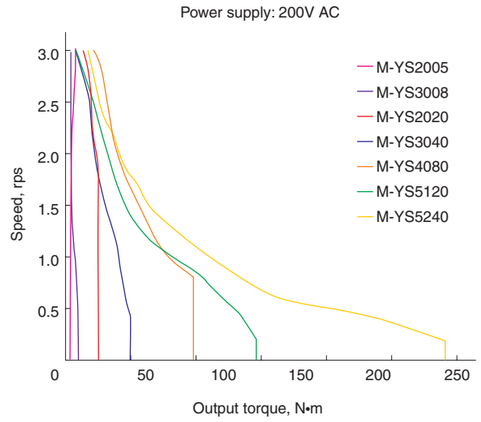
Motor type	Brake model	Static friction torque (N•m)	Torsional rigidity (sec./N•m)	Brake clamping time (msec)	Brake releasing time (msec)	Capacity (W)
YS2020	RNB2K	20	4.5	26	10	17
YS3040	RNB4K	40	4.9	62	3	23
YS4080	RNB8K	80	1.3	66	5	30
YS5120	RNB12K	120	1.9	78	9	33

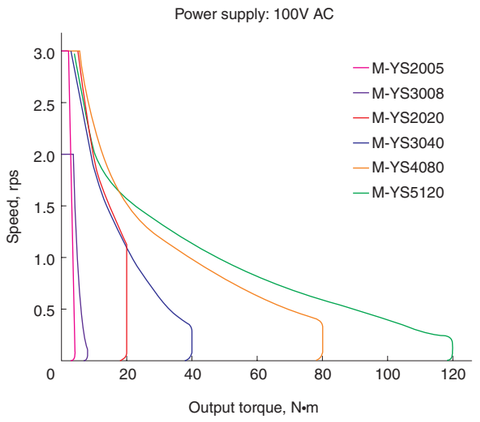
Choosing a Motor

When selection a motor, please take note of the characteristics described on the next four pages.

Speed-torque Characteristics

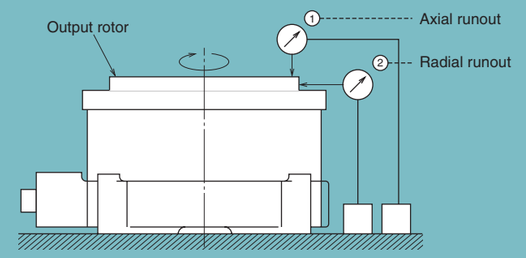
Each of the Megatorque Motors' YS Series gives very high torque at low speeds. These graphs show the speed-torque characteristics at 200V and 100V AC.





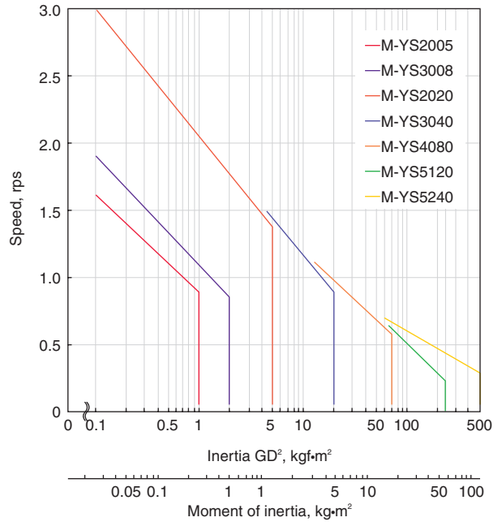
Accuracy Standards

The YS Series achieves small runout
① Axial runout (mm): 0.050 max.
② Radial runout (mm): 0.050 max.



Maximum Speed-load Characteristics

This graph shows the maximum speed of each motor when rotated through 180° under a load.
Important: This graph does not show maximum inertia values. If you plan to use a YS Series motor at or near the inertia limit, please consult NSK before placing your order.



How to Determine Minimum Positioning Time

For your reference, this page shows how to determine minimum positioning time with Megatorque Motors' YS Series.

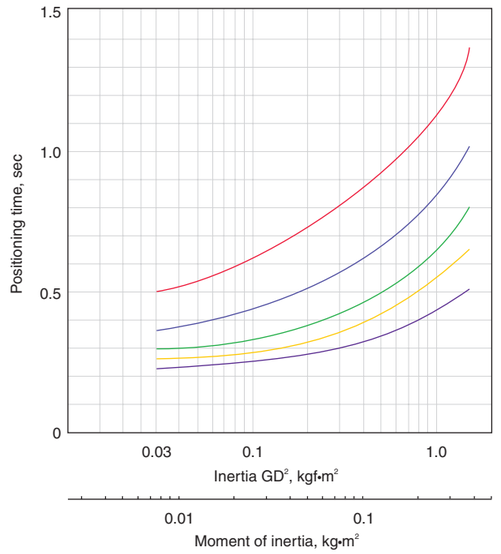
To determine minimum positioning time, find the total of the moment of inertia of the work or jig mounted on the motor and the moment of inertia of the motor itself, then read off the minimum positioning time from the appropriate graph below.

Example

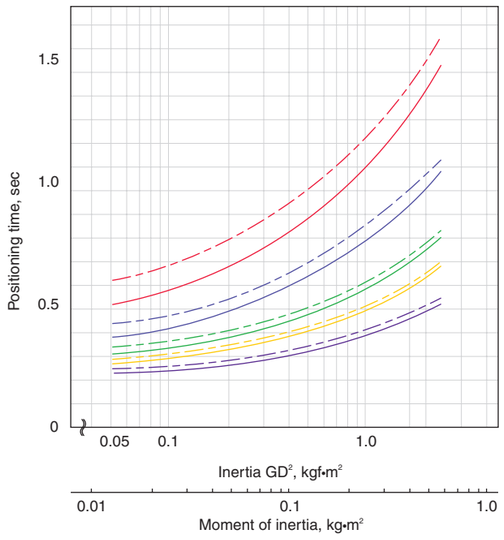
Motor: M-YS3040FN501 (at 100/110V AC)
Total moment of inertia: 1.25 kg•m² (GD² = 5 kgf•m²)
Index angle: 30°
In this case, the minimum positioning time will be 0.5 sec. as shown by the arrow on page 23.

Minimum positioning time curves

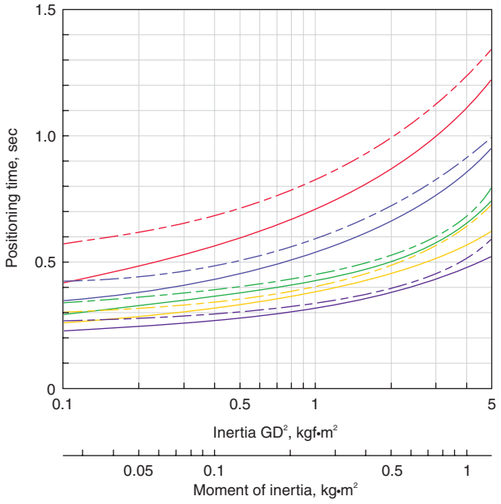
Motor No.s starting M-YS2005
(100V and 200V power supplies give identical curves)



Motor No.s starting M-YS3008



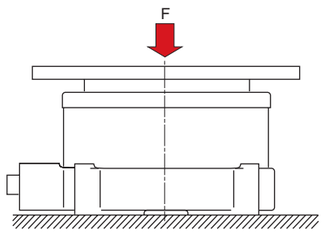
Motor No.s starting M-YS2020



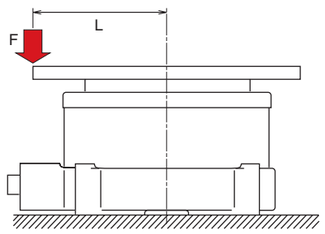


How to Calculate Axial and Moment Loads

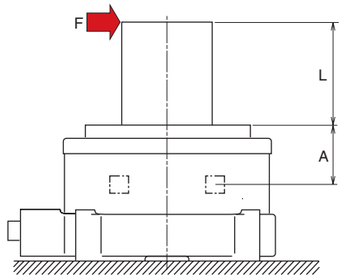
Axial and moment loads



If F is an external force, then
• Axial load Fa = F + weight of payload
• Moment load M = 0



If F is an external force, then
• Axial load Fa = F + weight of payload
• Moment load M = F×L

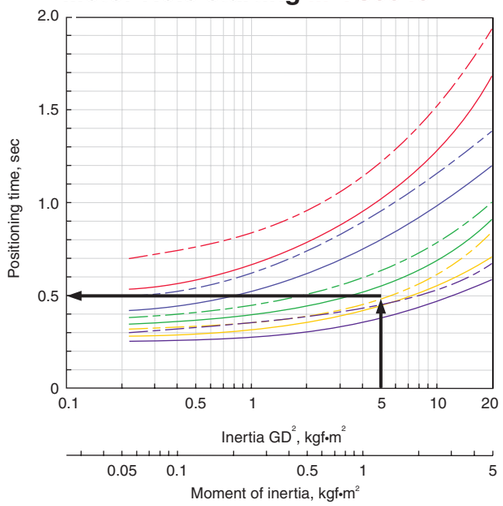


If F is an external force, then
• Axial load Fa = weight of payload
• Moment load M = F×(L+A)

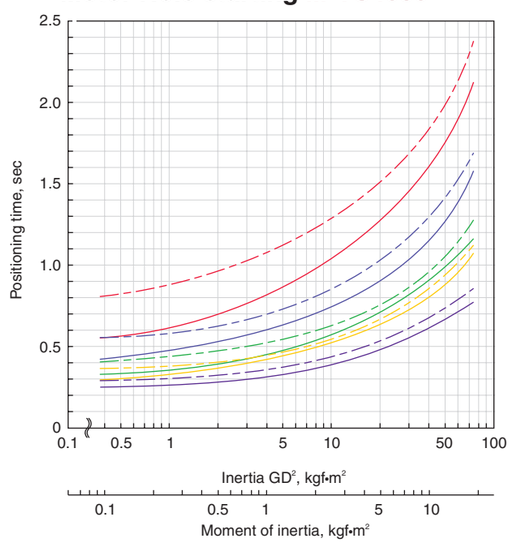
Motor order numbers starting with	M-YS2005	M-YS3008	M-YS2020	M-YS3040	M-YS4080	M-YS5120	M-YS5240
Dimension A (mm)	26	25.5	46.5	52.5	54	58.5	58.5

Choosing a Motor

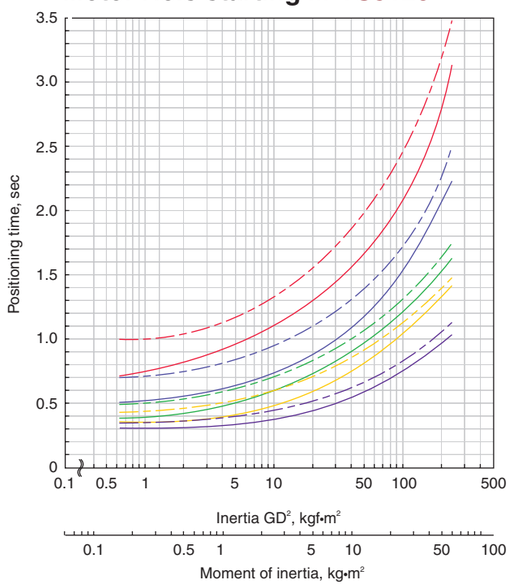
Motor No.s starting M-YS3040



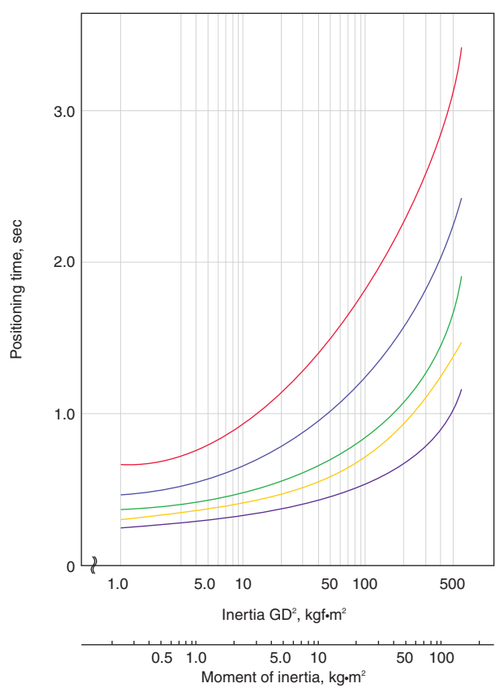
Motor No.s starting M-YS4080



Motor No.s starting M-YS5120



Motor No.s starting M-YS5240
(available only 200V AC versions)



CE Marking

Outline

Before any item of machinery can be exported to a country in the European Union, it must conform to the new European system of safety requirements (CE Marking).
The CE Marking certifies that a product conforms to EC directives.
NSK has worked with specialist consultants, an EU Notified Body and an EU Competent Body to ensure that the all products in the Megatorque Motors' YS Series conform to the CE Marking Directives.
NSK positions the YS Series as "components" to be incorporated in any system that you, the user, may build and has published an "EC declaration of Incorporation" to this effect. This is intended to facilitate their incorporation into your system and the CE Marking of the overall system.

The pertinent EC directives are as follows:

- **Machinery Directive** ——— Effective as of January 1, 1995
  A directive governing mechanical, electrical and human safety
- **Electromagnetic Compatibility Directive** ——— Effective as of January 1, 1996
  A directive governing the effect of electromagnetic waves on other devices
- **Low Voltage Directive** ——— Effective as of January 1, 1997
  A directive governing electrical safety

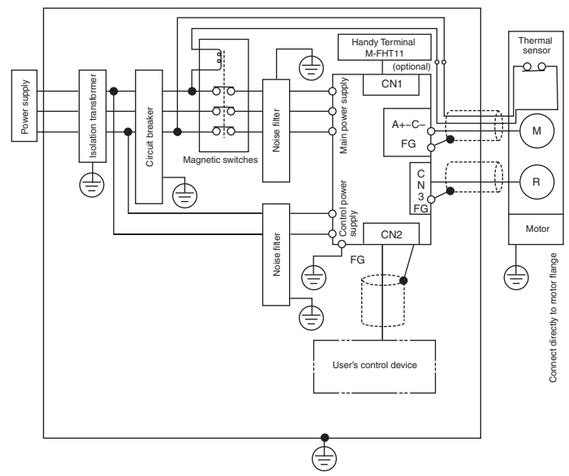
If you plan to incorporate a Megatorque Motor into your own system, you must:

- install an isolation transformer and circuit breaker in front of the main power supply
- install a noise filter(s) in front of the main power supply
- install a circuit that will shut down the main power supply on detecting output from the motor's internal thermal sensor
- provide additional protection against water and foreign particles, depending on the specifications of the system into which the motor is to be incorporated (for more information, please contact NSK)

Example Wiring Diagram

For your convenience, we offer this example of a wiring diagram of a system incorporating a Megatorque Motor.

Wiring diagram



Determining Your Requirements

These two pages give all the numbers you will need to order any product from the YS Series or a complete Megatorque Motor system. For your convenience, the numbers are grouped according to compatibility of components, the order numbers for the appropriate ESA Driver Unit and cable sets being shown next to the order numbers for the Megatorque Motors.

Order Numbers

Systems based on a YS motor in standard inventory

Combinations with ESA23 Driver Units

Motor order no.	Driver Unit order no.	Supply voltage
M-YS2020GN001	M-ESA-Y2020T23	200V AC
	M-ESA-Y2020V23	100V AC
M-YS3040GN501	M-ESA-Y3040T23	200V AC
	M-ESA-Y3040V23	100V AC
N-YS4080GN001	M-ESA-Y4080T23	200V AC
	M-ESA-Y4080V23	100V AC
M-YS5120GN001	M-ESA-Y5120T23	200V AC
	M-ESA-Y5120V23	100V AC
M-YS5240GN001	M-ESA-Y5240T23	200V AC

Cable set order no.	Cable length
M-C002SS29	2m
M-C004SS29	4m
M-C008SS29	8m
M-C015SS29	15m
M-C030SS29	30m

Note: M-YS5240 motors are available only in 200V AC versions.

Combinations with ESA25 Driver Units

Motor order no.	Driver Unit order no.	Supply voltage
M-YS2020GN001	M-ESA-Y2020T25	200V AC
	M-ESA-Y2020V25	100V AC
M-YS3040GN501	M-ESA-Y3040T25	200V AC
	M-ESA-Y3040V25	100V AC
N-YS4080GN001	M-ESA-Y4080T25	200V AC
	M-ESA-Y4080V25	100V AC
M-YS5120GN001	M-ESA-Y5120T25	200V AC
	M-ESA-Y5120V25	100V AC
M-YS5240GN001	M-ESA-Y5240T25	200V AC

Cable set order no.	Cable length
M-C002SS29	2m
M-C004SS29	4m
M-C008SS29	8m
M-C015SS29	15m
M-C030SS29	30m

Note: M-YS5240 motors are available only in 200V AC versions.

System based a YS motor with knock-pin holes

Combinations with ESA23 Driver Units

Motor order no.	Driver Unit order no.	Supply voltage
M-YS2020GN011	M-ESA-Y2020T23	200V AC
	M-ESA-Y2020V23	100V AC
M-YS3040GN511	M-ESA-Y3040T23	200V AC
	M-ESA-Y3040V23	100V AC
N-YS4080GN011	M-ESA-Y4080T23	200V AC
	M-ESA-Y4080V23	100V AC
M-YS5120GN011	M-ESA-Y5120T23	200V AC
	M-ESA-Y5120V23	100V AC
M-YS5240GN011	M-ESA-Y5240T23	200V AC

Cable set order no.	Cable length
M-C002SS29	2m
M-C004SS29	4m
M-C008SS29	8m
M-C015SS29	15m
M-C030SS29	30m

Note: M-YS5240 motors are available only in 200V AC versions.

Combinations with ESA25 Driver Units

Motor order no.	Driver Unit order no.	Supply voltage
M-YS2020GN011	M-ESA-Y2020T25	200V AC
	M-ESA-Y2020V25	100V AC
M-YS3040GN511	M-ESA-Y3040T25	200V AC
	M-ESA-Y3040V25	100V AC
N-YS4080GN011	M-ESA-Y4080T25	200V AC
	M-ESA-Y4080V25	100V AC
M-YS5120GN011	M-ESA-Y5120T25	200V AC
	M-ESA-Y5120V25	100V AC
M-YS5240GN011	M-ESA-Y5240T25	200V AC

Cable set order no.	Cable length
M-C002SS29	2m
M-C004SS29	4m
M-C008SS29	8m
M-C015SS29	15m
M-C030SS29	30m

Note: M-YS5240 motors are available only in 200V AC versions.

System based on a YS motor with a brake

Combinations with ESA25 Driver Units

Motor order no.	Driver Unit order no.	Supply voltage
M-YS2020GG001	M-ESA-Y2020T25	200V AC
	M-ESA-Y2020V25	100V AC
M-YS3040GG501	M-ESA-Y3040T25	200V AC
	M-ESA-Y3040V25	100V AC
N-YS4080GG001	M-ESA-Y4080T25	200V AC
	M-ESA-Y4080V25	100V AC
M-YS5120GG001	M-ESA-Y5120T25	200V AC
	M-ESA-Y5120V25	100V AC

Cable set order no.	Cable length
M-C002SS28	2m
M-C004SS28	4m
M-C008SS28	8m
M-C015SS28	15m
M-C030SS28	30m
Brake power supply	Supply voltage
M-FZ603	200V AV

Note: The external brake power supply runs only on 200V AC. If you plan to use a 100V AC power supply, you will need a voltage transformer.

System based on a low-profile YS motor

Combinations with ESA23 Driver Units

Motor order no.	Driver Unit order no.	Supply voltage
M-YS2005GN001	M-ESA-Y2005T23	200V AC
	M-ESA-Y2005V23	100V AC
M-YS3008GN001	M-ESA-Y3008T23	200V AC
	M-ESA-Y3008V23	100V AC

Cable set order no.	Cable length
M-C002SS29	2m
M-C004SS29	4m
M-C008SS29	8m
M-C015SS29	15m
M-C030SS29	30m

Combinations with ESA25 Driver Units

Motor order no.	Driver Unit order no.	Supply voltage
M-YS2005GN001	M-ESA-Y2005T25	200V AC
	M-ESA-Y2005V25	100V AC
M-YS3008GN001	M-ESA-Y3008T25	200V AC
	M-ESA-Y3008V25	100V AC

Cable set order no.	Cable length
M-C002SS29	2m
M-C004SS29	4m
M-C008SS29	8m
M-C015SS29	15m
M-C030SS29	30m

Handy Terminal

The Handy Terminal is compatible with all motors and Driver Units.

Handy Terminal order number	M-FHT11

Caution

- Do not use these units in environments prone to fire or explosion.
- Please read the instruction manual carefully before using these units.

Order Form

Please use this form to list your system requirements. The information you give us will help to ensure that the components selected provide the optimum performance for your needs. If you would like more information about any aspect of the Megatorque Motor system, please contact your NSK representative at one of our worldwide offices listed on the back cover.

Your name and title

Department/Company

Address

Phone: Fax:

Motor load capacity required
Axial load_____(N)
Moment load_____(N•m)

Max. motor speed required (2 or 3 rps) _____(rps)

Power supply to be used (100V or 200V AC) _____(V AC)

How many Megatorque Motors do you need? _____of model
(Please complete order number) **M-YS** _____

How many ESA Driver Units do you need? _____of model
(Please complete order number) **M-ESA** _____

How many Handy Terminals do you need?
_____of model **M-FHT11**

How many cables do you need? _____of model
(Please complete order number) **M-C0** _____

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