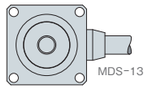
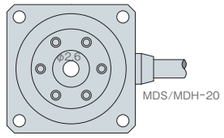
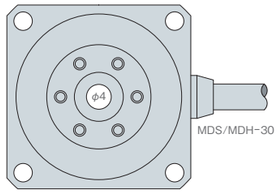
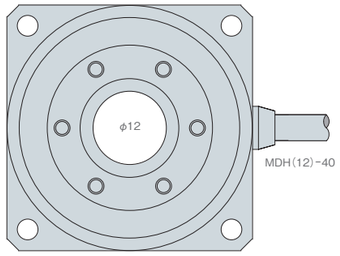
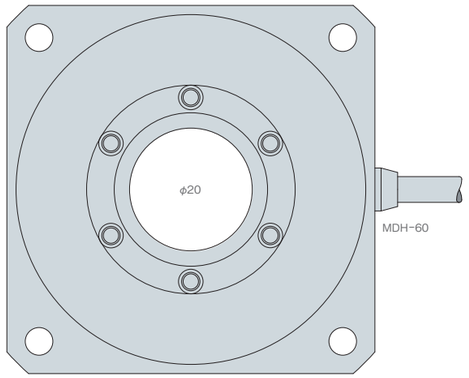
Full-scale

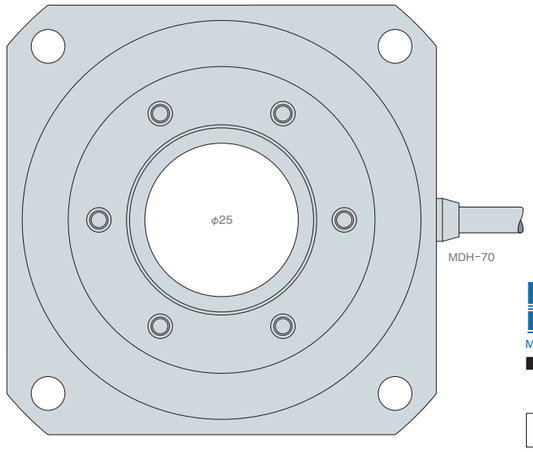












MDS-13 series

The world's smallest direct drive motor.
Perfect for light work gripper such as electronic part.

- Body diameter: φ13 mm
  Body length: 26/32/38 mm
- Max torque: 7/15/25 mN·m
- Max speed: 3000 rpm
- Max resolution: 11 bit

MDS/MDH-20 series

The smallest through-shaft servomotor in the world.
Perfect for end effector (hand, gripper, Zθ unit) with through-shaft.
It could be used for small hand in combination with low slowdown rate gear.

- Body diameter: φ21 mm
  Body length: 32/38/44 mm
- Max torque: 40/90/130 mN·m
- Max speed: 3000 rpm
- Max resolution: 288,000 P/R(Multiplied by 4), 18 bit
- Hollow diameter: φ2.6 mm (MDH type)

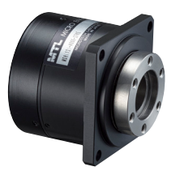
MDS/MDH-30 series

Perfect for highly-precise dispenser and small gimbal driving.

- Body diameter: φ30 mm
  Body length: 32/38/44 mm
- Max torque: 140/280/420 mN·m
- Max speed: 1000 rpm
- Max resolution: 432,000 P/R(Multiplied by 4), 19 bit
- Hollow diameter: φ4 mm (MDH type)

MDH(12)-40 series

Series of MDH-40 with larger internal diameter.
Internal diameter of φ12mm allows passing cable and laser etc.



- Body diameter: φ40 mm
  Body length: 32/38/44 mm
- Max torque: 0.33/0.70/1.0 N·m
- Max speed: 450 rpm
- Max resolution: 1,296,000 P/R(Multiplied by 4)
- Hollow diameter: φ12 mm (MDH type)

MDH-60 series

Small-sized large bore hollow shaft.
Perfect for end effector and robot joint etc.

- Body diameter: φ60 mm
  Body length: 32/38/44 mm
- Max torque: 1.1/2.1/2.7 N·m
- Max speed: 300 rpm
- Max resolution: 2,000,000 P/R
  (Multiplied by 4), 20 bit
- Hollow diameter: φ20 mm

MDH-70 series

Small-sized large diameter hollow shaft.
Perfect for index table, replacement of rotary actuator, robot (corresponds to elbow and shoulder)

- Body diameter: φ70 mm
  Body length: 32/38/44 mm
- Max torque: 1.0/2.2/3.1 N·m
- Max speed: 200 rpm
- Max resolution: 2,592,000 P/R
  (Multiplied by 4), 21 bit
- Hollow diameter: φ25 mm

MTL
MICROTECH LABORATORY INC.

■**Head office:** 8-1-46 Honcho, Kamitsuruma, minami-ku Sagamihara-shi Kanagawa 252-0318, Japan
PHONE.81-42-746-0123 FAX.81-42-746-0960

https://motor.mtl.co.jp/english/

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MTL
MICROTECH LABORATORY INC.

μDD Motor Product guide

MICROTECH LABORATORY INC.

μDD Motor series

Motor Details Page

ϕ13mm

MDS-13 series

Smallest DD Motor in the World

suitable for lightwork grippers and robot hands.

ϕ21mm

MDS/MDH-20 series

Smallest Hollow-shaft Motor in the World

Perfectly work for Robot Hands/Grippers with Zθ unit.

ϕ30mm

MDS/MDH-30 series

Perfectly work for high precision dispencer and gimbal drives.
Hole tap inside is customable.

ϕ40mm

MDH(12)-40 series

"LESS SPACE" because the hollow shaft can be used to pass cables and laser beam.

ϕ60mm

MDH-60 series

(Multifunction) product that can be applied in various ways such as End Effector,index drive shaft, robot joints, etc.

ϕ70mm

MDH-70 series

suitable for indexing table, hollow geared motor replacement and robot arms.

Inventory status

High-precision Options

Standard features

- Precisely built with high resolving power and accuracy in the started at 1arc sec.
  Available in inceremental and absolute.
- Built in angular bearing and deep groove bearing make it extremely durable and can handle high direct load.

Upgrade Options

- Based on encoder type, rotation accuracy and maximum rotation speed can be improved.
- High precision enablling shaft runout of ±5μm can be achieved.
- Cross roller bearing improve shaft rigidity,pursuing high precision and NRRO.
- Built in Flange mounting is changeable to freestanding type.

Customization page

High Torque Options

Standard features

- World's smallest rotary encoder designed by our expert. SMALL but HIGH DENSITY and ACCURACY. 3TIMES faster than conventional AC servo Motors.

High Torque Options

- low-speed gears design and compact with back driveability, low inertia and reduction ratios by 1/3 and 1/9.
- Torque diameter is expandable up to ϕ70 or more.

Low-speed Gears page

Hollow-shaft Options

Standard features

- Hollow shaft outer diameter is available up to 30%.

Hollow shaft optimization options

- Hollow shaft taps is customable by request.
  rotary joints directly connected and cables or air tubes can pass through without touching the ends of hollow shaft.
- Hollow inner diameter is customable.
- Shaft can be designed as request.
  Shaft is customable as request.

Customization page

Customization Examples

- Encoder resolution is changeable
- Hollow shaft expansion
- Flangeless structure for motor cases
- Customable hole tap
- Cable extension and connector
- Support for low dust-generation
- Output shaft structure change
  (Change to pinion gear, positioning pin addition, knurling, alumite aluminum, etc.)
- Built-in motors
- IP improvement
- Customable Vacuum

To meet your needs of specification, we accept customization even just one unit. Feel free to contact us.

Collaboration amplifiers

Catalog Download page

Panasonic

EtherCAT

RTEX Realtime Express

MINAS A6 Family

MITSUBISHI ELECTRIC

SSCNET III/H SERVO SYSTEM CONTROLLER NETWORK

MELSERVO-J4

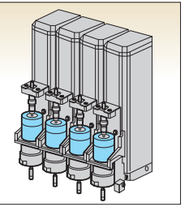
Drive μDD motors with a conventional system

We offer various conversion cables

Super-compact with hollow shaft

We have shafts with super-compact outer diameters of ϕ21-70 that are also hollow all the way through. (ϕ2.6-25mm)
Compressed air tubes, laser beams, and more can pass through hollow shafts, enabling smaller and faster-acting end effectors.

- Die bonders, chip mounters, chip conveyors, bonding devices, laminators, test handlers, etc.



Advantages

- Hollow shafts
  (Cables, compressed air tubes, laser beams, ball screws, or spline shafts can pass through)
- Compact and efficient
- High-precision positioning,high speed precision and torque accuracy
- Compliance control, high back-drivability
- Low-speed, high-torque drive, speed ripple reduction
- Less noise great performance

We also have another collaboration amplifier available. Feel free to contact us for support.

MTL Drivers

Specialized compact drivers for researchers and engineers

Compatible with all μDD motor types
Pulse stream, analog voltage, SPI communication

We offer various optional cables

Product Details page

Cables

We can provide you extension cables and conversion

Product and inventory status

Devices and mechanical units

We propose devices and mechanical units that use μDD motors

Product Details page

MTL

μDD Motor

Micro Direct Drive Motor

MD series

μDDMotor

Miniature AC servomotor with high torque and high-resolution

Features

- Built-in high performance encoder that enables direct fine positioning from resolutions of 1 arc-sec.
- Delivers high torque using high performance magnets and high density winding technology.
- Delivers small size with the motor and encoder designed as a single unit.
- Able to bear large loads directly through the use of a high stiffness bearing.
- Able to support hollow shaft structures.
- Customized designs are supported to suit our customer needs.

MICROTECH LABORATORY INC.

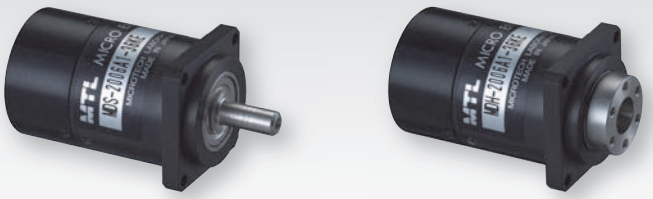
Delivering a lineup with a wide range of application options of compact high-performance next-generation servo motors with built in encoders.

MDS-13 series

- Body diameter: ϕ13 mm
  Body length: 26/32/38 mm
- Max torque: 7/15/25 mN·m
- Max speed: 3000 rpm
- Max resolution: 500 P/R, 11 bit

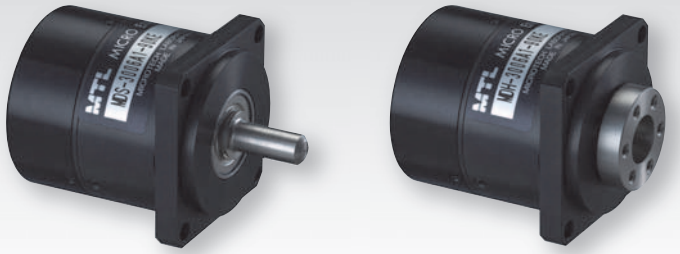
MDS/MDH-20 series

- Body diameter: ϕ21 mm
  Body length: 32/38/44 mm
- Max torque: 40/90/130 mN·m
- Max speed: 3000 rpm
- Max resolution: 72,000 P/R, 18 bit
- Hollow diameter: ϕ2.6 mm (MDH type)



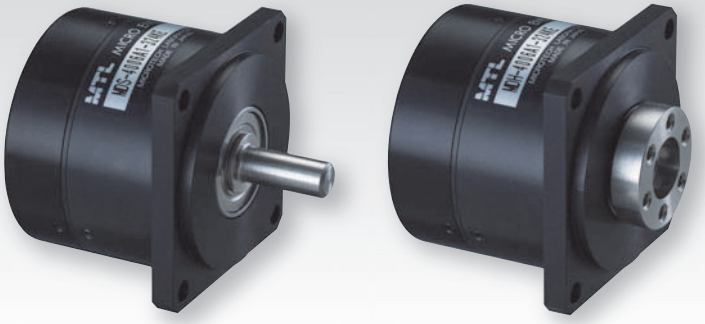
MDS/MDH-30 series

- Body diameter: ϕ30 mm
  Body length: 32/38/44 mm
- Max torque: 140/280/420 mN·m
- Max speed: 1000 rpm
- Max resolution: 108,000 P/R, 19 bit
- Hollow diameter: ϕ4 mm (MDH type)



MDS/MDH-40 series

- Body diameter: ϕ40 mm
  Body length: 32/38/44 mm
- Max torque: 0.33/0.70/1.0 N·m
- Max speed: 450 rpm
- Max resolution: 324,000 P/R, 20 bit
- Hollow diameter: ϕ6 mm (MDH type)



MDH-70 series

- Body diameter: ϕ70 mm
  Body length: 32/38/44 mm
- Max torque: 1.0/2.2/3.1 N·m (with DC48V drive)
- Max speed: 200 rpm
- Max resolution: 648,000 P/R, 21 bit
- Hollow diameter: ϕ25 mm (MDH type)

MDS/MDH-20 series (Characteristic example)

MDS-20

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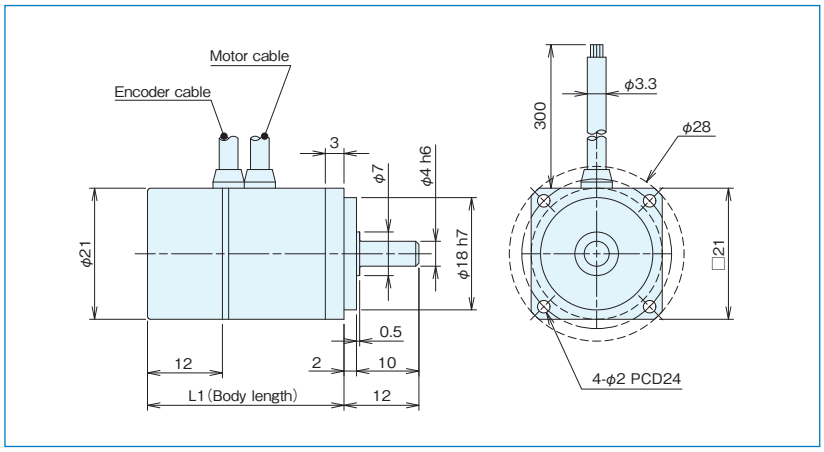
Outer Dimensions



MDH-20

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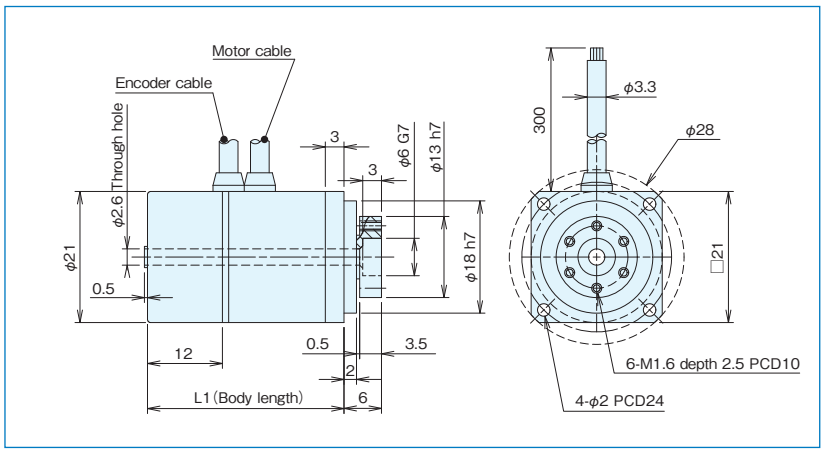
Outer Dimensions



Model	L1 dimension
MD□−2006	31.5
MD□−2012	37.5
MD□−2018	43.5

Standard models

MD■−20△−36KE (Incremental)
MDS−20△−18B (Absolute)
■:Shaft shape S(solid shaft), H(Hollow shaft) △:Body length 06,12,18

Note: Please ask us if there is a particular resolution you prefer.

MDS/H-20 series (Representative characteristics of standard models)

	Unit	MDS-2006	MDH-2006	MDS-2012	MDH-2012	MDS-2018	MDH-2018
Input power (Driver input)	DCV	24					
Maximum speed	rpm	3000					
Rated speed	rpm	1500					
Peak torque at stall	Nm	0.04		0.09		0.13	
Rated torque	Nm	0.017		0.030		0.040	
Continuous rated torque	Nm	0.014		0.026		0.030	
Peak power	W	5.0		10		17	
Peak power rate	kW/s	19	15	62	43	99	65
Peak armature current	Arms	2.6		4.3		5.6	
Rated armature current (*1)	Arms	1.1		1.2		1.4	
Voltage constant	V/krpm	1.6		2.5		2.4	
Torque constant (at25℃)	Nm/Arms	0.015		0.024		0.023	
Line armature resistance (at25℃)	Ω	3.5		2.2		1.9	
Line armature inductance	mH	1.1		0.79		0.82	
Rotor Poles	P	10					
Max encoder resolution	P/R	Incremental:72,000/Absolute:262,144 (18bit)					
Moment of inertia J	g·cm^2	0.78	1.5	1.2	2.0	1.7	2.4
Permissible radial load Fr	N	44					
Permissible axial load Fa	N	22					
Load reference point distance La	mm	29.8	28.5	35.7	34.5	41.7	40.4
Mass	kg	0.088		0.10		0.12	
Applicable motor driver		MC−110−2406					
Standard heat sink		100×100×5 Aluminum					

Note: (*1) Rated armature current is the value measured with the standard heat sink attached to the motor at an ambient temperature of 40°C.
* The absolute encoder is only available with the MDS type.

MDS/MDH-30 series (Characteristic example)

MDS-30

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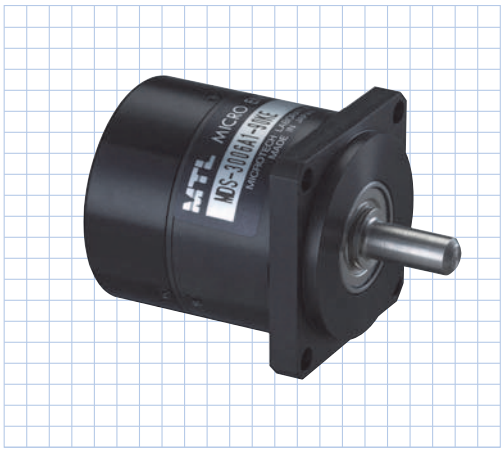
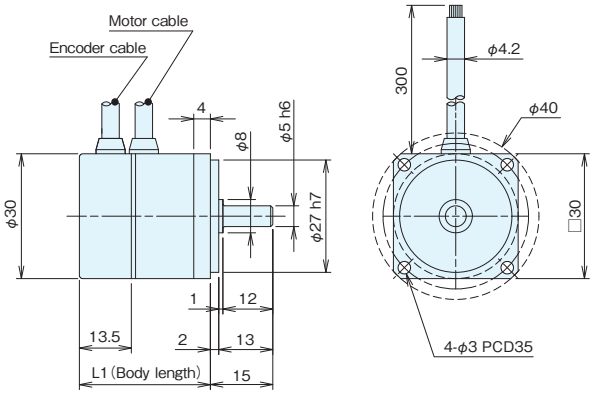


Outer Dimensions



MDH-30

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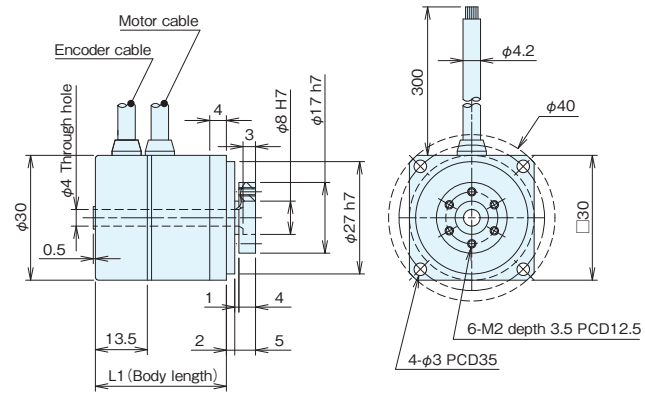
Outer Dimensions



Model	L1 dimension
MD□−3006	31.5
MD□−3012	37.5
MD□−3018	43.5

Standard models

MD■−30△−108KE (Incremental)
MD■−30△−19B (Absolute)
■:Shaft shape S(solid shaft), H(Hollow shaft) △:Body length 06,12,18

Note: Please ask us if there is a particular resolution you prefer.

MDS/H-30 series (Representative characteristics of standard models)

	Unit	MDS-3006	MDH-3006	MDS-3012	MDH-3012	MDS-3018	MDH-3018
Input power (Driver input)	DCV	48					
Maximum speed	rpm	1000					
Rated speed	rpm	1000					
Peak torque at stall	Nm	0.14		0.28		0.42	
Rated torque	Nm	0.060		0.095		0.13	
Continuous rated torque	Nm	0.044		0.068		0.10	
Peak power	W	15		20		30	
Peak power rate	kW/s	31	23	71	60	110	98
Peak armature current	Arms	4.6		5.6		6.3	
Rated armature current (*1)	Arms	1.8		1.8		1.7	
Voltage constant	V/krpm	2.8		4.5		6.8	
Torque constant (at25℃)	Nm/Arms	0.026		0.043		0.065	
Line armature resistance (at25℃)	Ω	2.1		2.3		2.5	
Line armature impedance	mH	1		1.3		1.5	
Rotor Poles	P	16					
Max encoder resolution	P/R	Incremental:108,000/Absolute:524,288 (19bit)					
Moment of inertia J	g·cm^2	6.5	8.9	11.2	13.6	15.9	18.3
Permissible radial load Fr	N	94					
Permissible axial load Fa	N	47					
Load reference point distance La	mm	32.0	30.0	38.0	36.0	43.9	41.9
Mass	kg	0.13		0.16		0.18	
Applicable motor driver		MC-110-2406/MC-110-4810					
Standard heat sink		120×120×8 Aluminum					

Note: (*1) Rated armature current is the value measured with the standard heat sink attached to the motor at an ambient temperature of 40°C.

MDS/MDH-40 series (Characteristic example)

MDS-40

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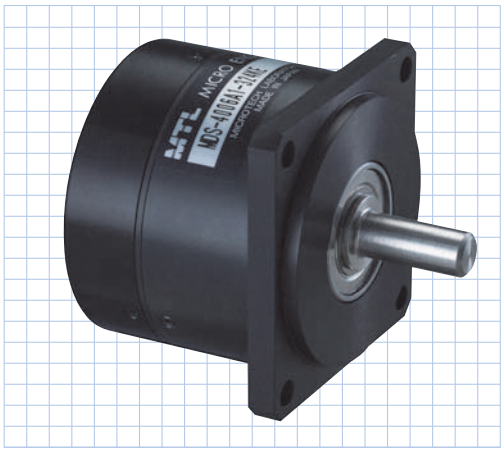
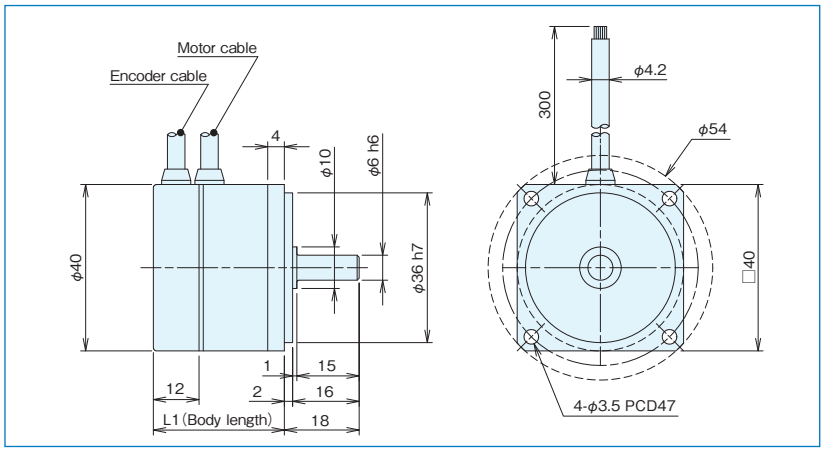


Outer Dimensions



MDH-40

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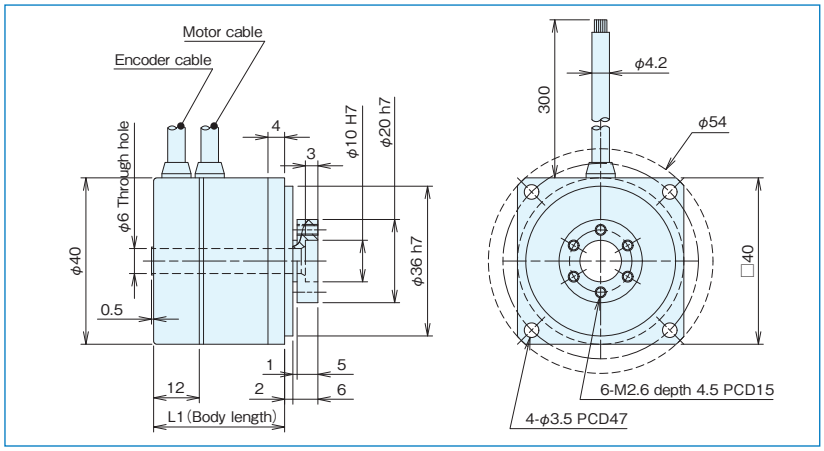
Outer Dimensions



Model	L1 dimension
MD□−4006	31.5
MD□−4012	37.5
MD□−4018	43.5

Standard models

MD■−40△−324KE (Incremental)
MD■−40△−20B (Absolute)
■:Shaft shape S(solid shaft), H(Hollow shaft) △:Body length 06,12,18

Note: Please ask us if there is a particular resolution you prefer.

MDS/H-40 series (Representative characteristics of standard models)

	Unit	MDS-4006	MDH-4006	MDS-4012	MDH-4012	MDS-4018	MDH-4018
Input power (Driver input)	DCV	48					
Maximum speed	rpm	450					
Rated speed	rpm	450					
Peak torque at stall	Nm	0.33		0.70		1.0	
Rated torque	Nm	0.12		0.20		0.28	
Continuous rated torque	Nm	0.10		0.16		0.23	
Peak power	W	14		27		40	
Peak power rate	kW/s	50	39	140	120	180	160
Peak armature current	Arms	6.3		7.5		10	
Rated armature current (*1)	Arms	1.6		1.7		2.3	
Voltage constant	V/krpm	6.1		10		11	
Torque constant (at25℃)	Nm/Arms	0.058		0.096		0.10	
Line armature resistance (at25℃)	Ω	2.6		2.5		1.7	
Line armature inductance	mH	2.6		3.0		2.0	
Rotor Poles	P	16					
Max encoder resolution	P/R	Incremental:324,000/Absolute:1,048,576 (20bit)					
Moment of inertia J	g·cm^2	22.6	28.8	38.4	44.5	54.2	60.3
Permissible radial load Fr	N	140					
Permissible axial load Fa	N	70					
Load reference point distance La	mm	37.7	35.2	43.7	41.2	49.6	47.1
Mass	kg	0.21		0.26		0.30	
Applicable motor driver		MC-110-4810					
Standard heat sink		150×150×8 Aluminum					

Note: (*1) Rated armature current is the value measured with the standard heat sink attached to the motor at an ambient temperature of 40°C.

MDH-70 series (Characteristic example)

MDH-70

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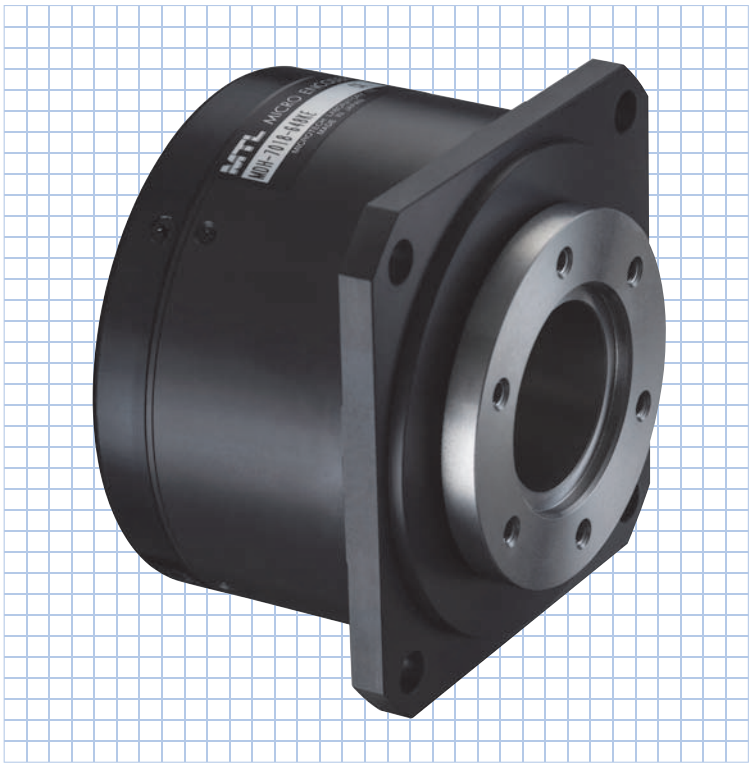
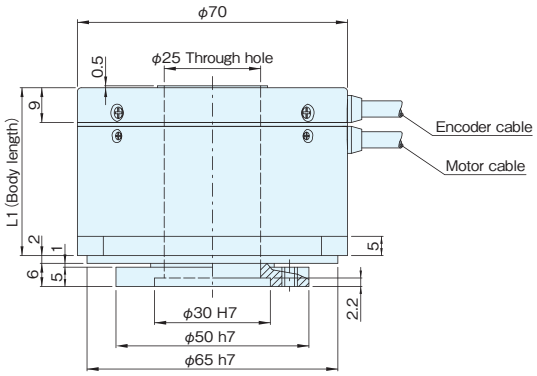
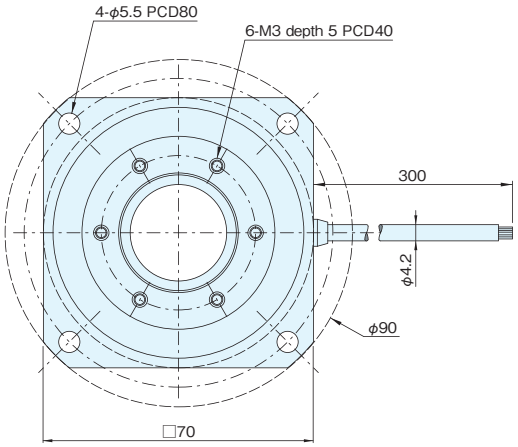


Outer Dimensions





Standard models

MDH−70△−648KE (Incremental)
MDH−70△−21B (Absolute)
△:Body length 06,12,18

Note: Please ask us if there is a particular resolution you prefer.

Model	L1 dimension
MDH−7006	31.5
MDH−7012	37.5
MDH−7018	43.5

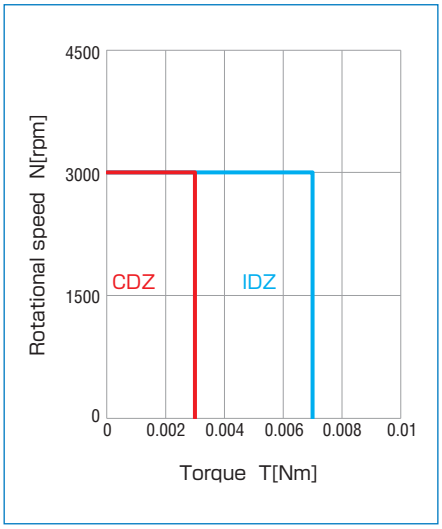
MDH-70 series (Representative characteristics of standard models) Note: When MC-110-4810 driven at DC48V

	Unit	MDH−7006	MDH−7012	MDH−7018
Input power (Driver input)	DCV	48		
Maximum speed	rpm	200		
Rated speed	rpm	200		
Peak torque at stall	Nm	1.0	2.2	3.1
Rated torque	Nm	0.36	0.66	1.0
Continuous rated torque	Nm	0.36	0.66	1.0
Peak power	W	30	60	90
Peak power rate	kW/s	24	83	147
Peak armature current	Arms	13	16	19
Rated armature current (*1)	Arms	2.8	3.0	3.5
Voltage constant	V/krpm	0.013	0.023	0.031
Torque constant (at25℃)	Nm/Arms	0.13	0.22	0.30
Line armature resistance (at25℃)	Ω	2.1	1.9	1.8
Line armature inductance	mH	2.6	3.1	3.3
Rotor Poles	P	20		
Max encoder resolution	P/R	Incremental:648,000/Absolute:2,097,152 (21bit)		
Moment of inertia J	kg·cm^2	0.65	0.82	0.99
Permissible radial load Fr	N	500		
Permissible axial load Fa	N	250		
Load reference point distance La	mm	27	33	38.9
Mass	kg	0.53	0.65	0.77
Applicable motor driver		MC−110−4810, MC−200−10020 (Under development)		
Standard heat sink		225×225×10 Aluminum		

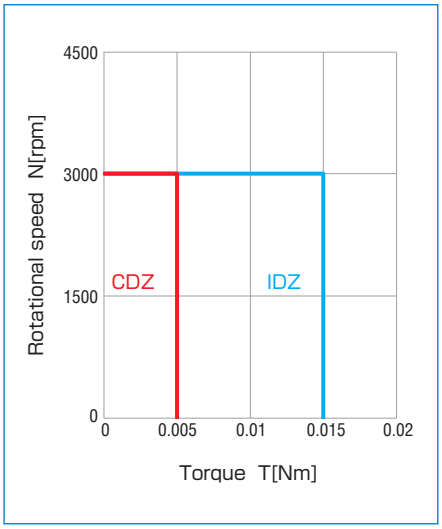
Note: (*1) Rated armature current is the value measured with the standard heat sink attached to the motor at an ambient temperature of 40°C.

Speed/torque characteristic examples

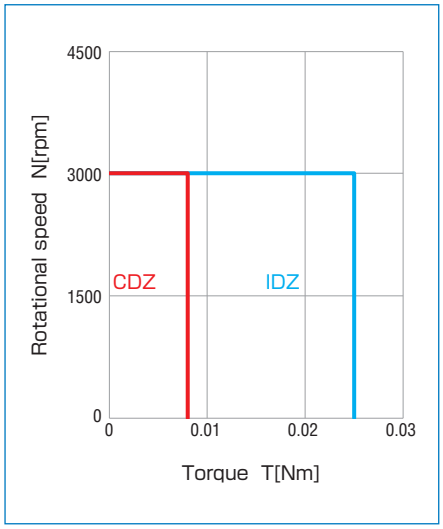
MDS-1306



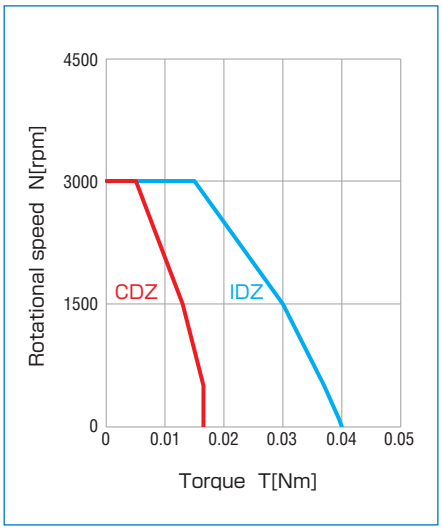
MDS-1312



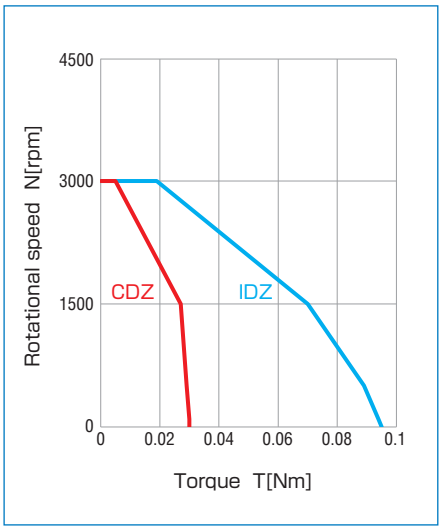
MDS-1318



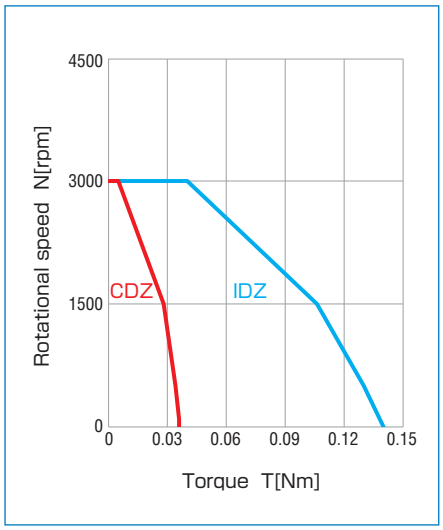
MDS/H-2006



MDS/H-2012



MDS/H-2018



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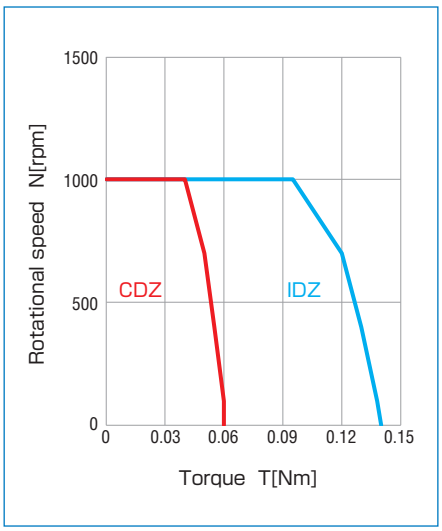

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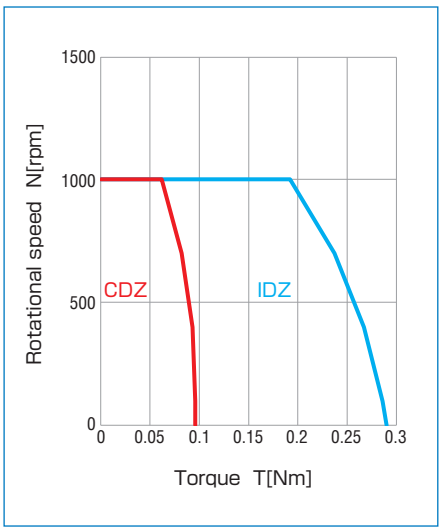

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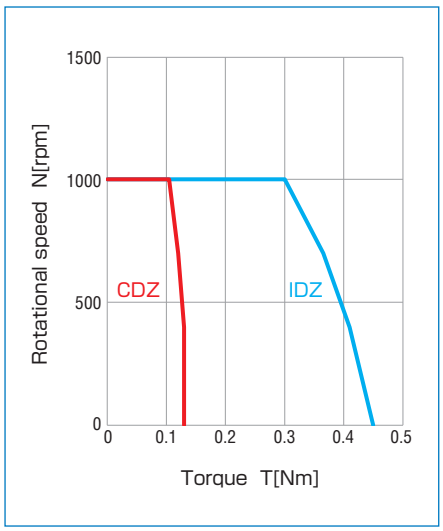

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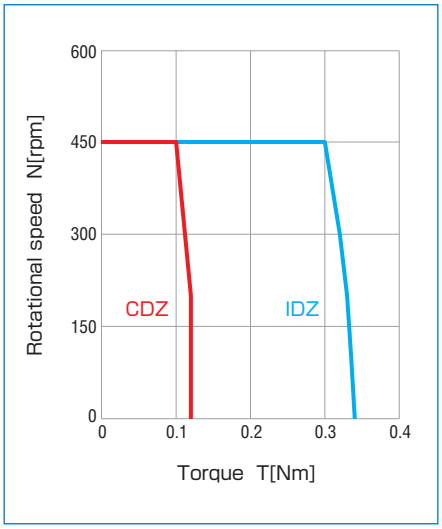

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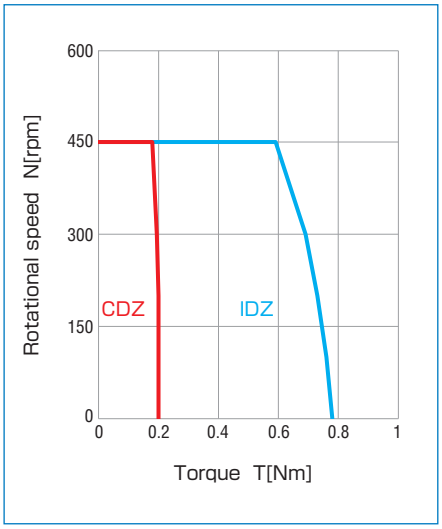

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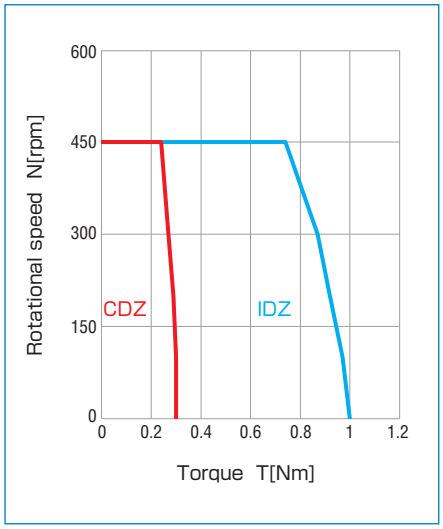
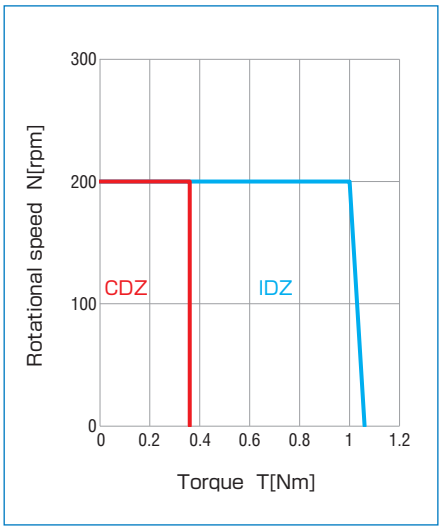


MDH-7006



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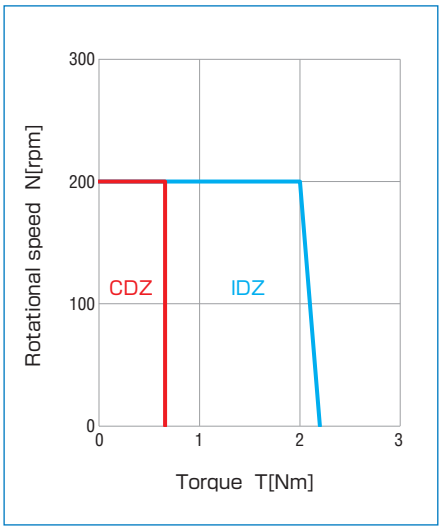

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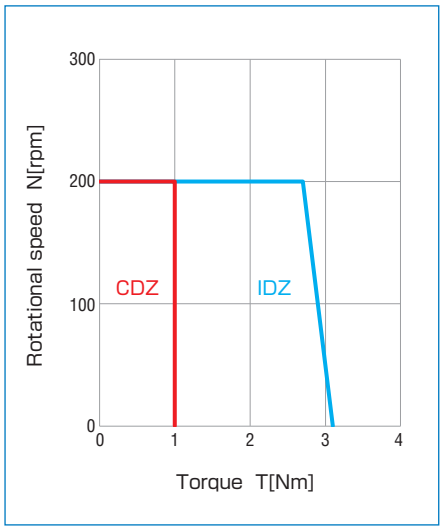

Notes

Usage regimes

①Continuous usage regime (CDZ)

Indicates the range of continuously operable torques and speeds.
The continuous operation range is the value when measures with the standard heat sink at the bottom of each spec table is fitted to the motor under an ambient temperature of 40°C.

②Intermittent usage regime (IDZ)

The range that can be used such as during short intermittent operation, startup, acceleration, deceleration, etc.
Refer to the overload duty characteristics in the separate document for details on the limits on torque and operation time during intermittent use. (Check the website or contact us)

Speed

The maximum speed of an incremental encoder is limited by the response frequency.
The speed range can also be further increased by reducing the encoder resolution.