■How to specify when ordering

SES - 10 - □
SE□ - 17 - □
ME□ - □ - □ □

- Series name
- Shaft type※1
- Slit plate diameter
- Output (Pulses per revolution)
- Blank: Voltage, C: Open collector, E: Line driver output

MA□ - 36 - □ □ □
MA□ - 50 - □ □ □

- Series name
- Shaft type※1
- Slit plate diameter
- Resolution
- Output Code※2
- Supply voltage※3

MLS - □ - □ - □

- Series name
- Slit plate diameter
- Resolution/Minimal reading unit
- Measurement range (mm)

※1

Single end	Hollow shaft	Double end
S	H	D

※2

Gray	Pure binary	BCD
G	N	B

※3

DC5V	DC12V	DC5~12V	24V
1	2	3	4

■Contents

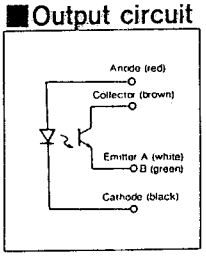
SUNSTAR MTL

SE series — Approx. Sine wave — (Incremental)

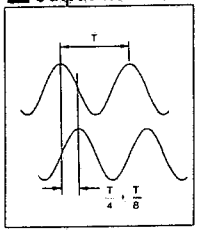
■Features

- SE series encoders serve as multi-function sensors for detecting angular deflection and movement in such small systems as office automation equipment, automatic vending machines and card readers.
- Their small size (shaft diameters of 2mm and 4mm) permits a high degree of design freedom for the OEM engineer.
- The low current consumption (10-12mA) of the SE series, along with their sine wave output, allows them to be connected directly to existing circuits.

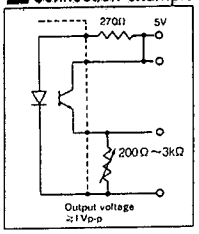
■Output circuit

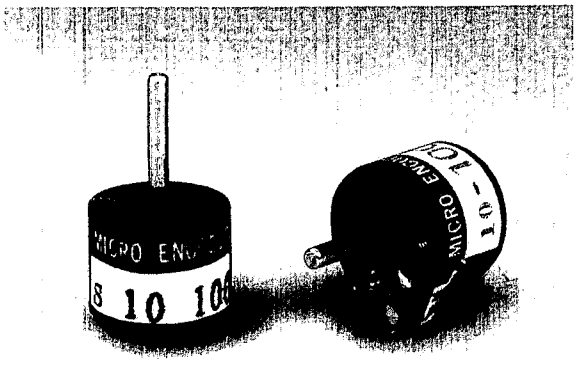


■Output waveform



■Connection example

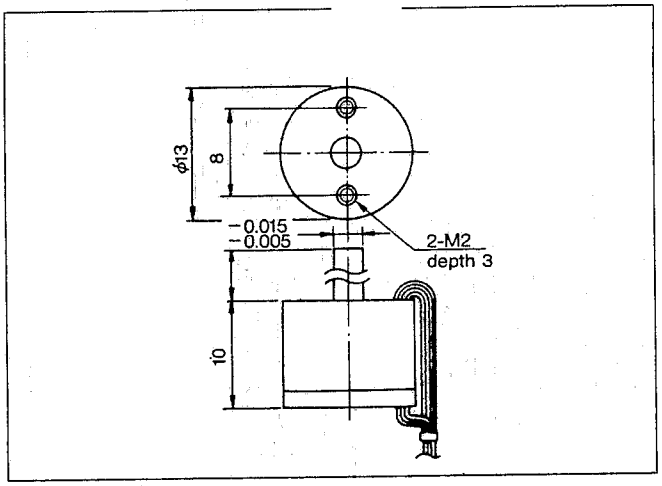


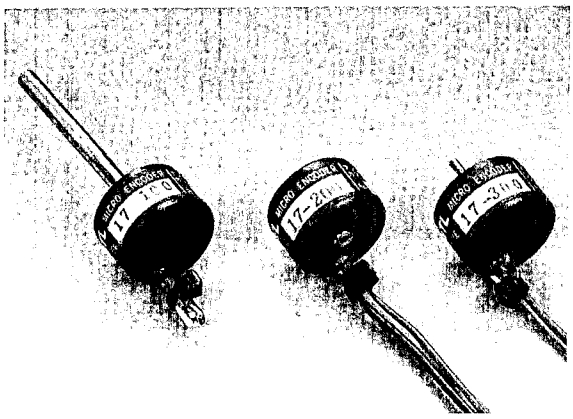


SES-10 series

Item \ Type		SES-10□(A/AB)
Supply voltage		DC5V
Current consumption		LED: maximum 20mA
Detection system		Incremental
Output: Pulses/revolution (standard)		100 200
Output: Output phase		A phase / A, B phase
Output: Output type		Approximate sine wave
Output: Output capacity		——
Output: Maximum frequency response		20kHz
Output: Output phase difference		A/B phase difference 90° ±45°
Output: Waveform rise/fall time		——
Starting torque		≦0.3×10^{-3}N·m(3gf-cm)
Allowable shaft loading	Radial	1.9N(200g)
	Axial	1.9N(200g)
Maximum rotational speed		6000min^{-1}
Operating range temperature /humidity		0°C～50°C
Storage ambient temperature		−20°C～80°C
Vibration resistance		Equivalent to ME series
Impact resistance		Equivalent to ME series
Cable		Vinyl cable 130mm
Weight		10g

■Dimensions, mm



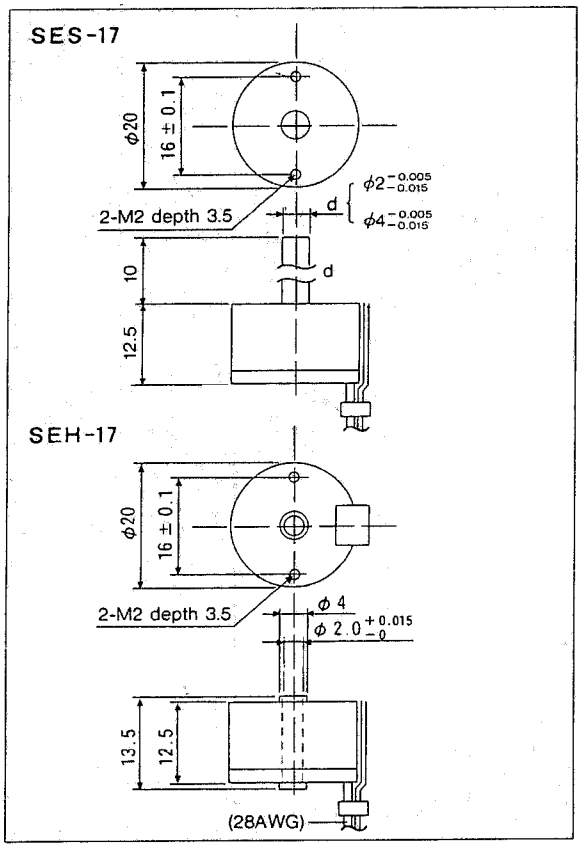


SE-17 series

■Typical applications

- Printers
- Money (Bill) counters
- Vending machines
- Card readers
- Pen recorders
- Office products

■Dimensions, mm



Item \ Type	SE□(2/※4)-17-□(A/AB)	
Supply voltage		DC5V
Current consumption		LED: maximum 20mA
Detection system		Incremental
Output	Pulses/revolution (standard)	100 200 300
Output	Output phase	A phase / A, B phase
Output	Output type	Approximate sine wave
Output	Output capacity	——
Output	Maximum frequency response	20kHz
Output	Output phase difference	A/B phase difference 90° ±45°
Output	Waveform rise/fall time	——
Starting torque		≦0.3×10⁻³N·m(3gf-cm)
Allowable shaft loading	Radial	1.9N(200g) ※4.9N(500g)
Allowable shaft loading	Axial	1.9N(200g) ※4.9N(500g)
Maximum rotational speed		6000min⁻¹
Operating range temperature /Humidity		0°C～50°C
Storage ambient temperature		−20°C～80°C
Vibration resistance		Equivalent to ME series
Impact resistance		Equivalent to ME series
Cable		Vinyl cable 130mm
Weight		23g

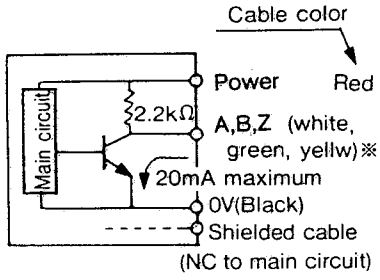
ME series — Square wave — (Incremental)

■Features

- The ME series includes encoders covering a wide range of pulses per revolution. In addition, we can custom fabricate encoders with non-standard pulse counts.
- This series encompasses a range of sizes from very small to large. The specific encoder should be chosen based on the shaft diameter and the number of pulses per revolution.
- All of the encoders have a thin cross section. The hole type is especially suited for installation where space is limited.
- Depending on the application, we can select encoders to optimize such specific characteristics as high signal-to-noise ratio or low power consumption.

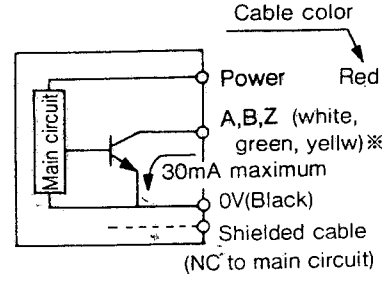
■Output Circuit Diagram

Voltage output (standard type)



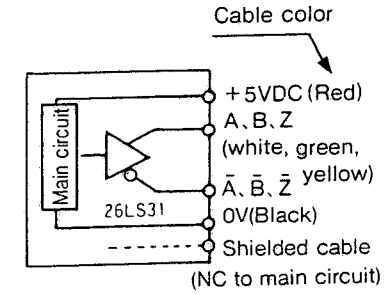
Supply voltage DC5～12V or 5/12V

(Optional) open collector output

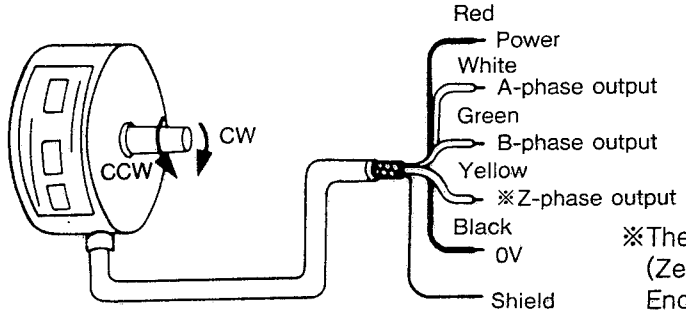


Supply voltage DC5～12V or 24V

(Optional) line driver output



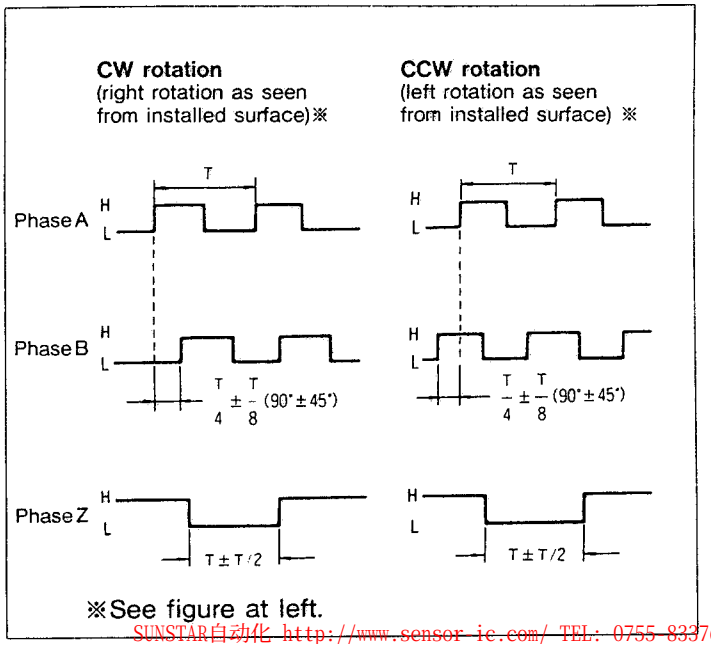
Supply voltage DC5V
Current consumption ≦150mA



3Power supply	
+5VDC(Red)	A,B,Z
0V(Black)	(Grey,Green,Yellow)
+15VDC(Orange)	A,B,Z
−15VDC(Orange/Black)	(Grey/White,Green/White,Yellow/White)

※The yellow wire is the Z-phase (Zero Signal : 1P/R) for those Encoder with a 3-phase output.

■Output waveform

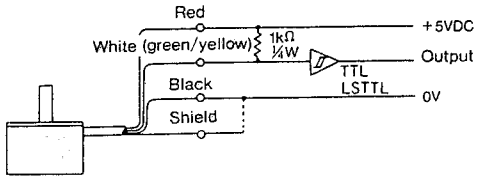


※See figure at left.

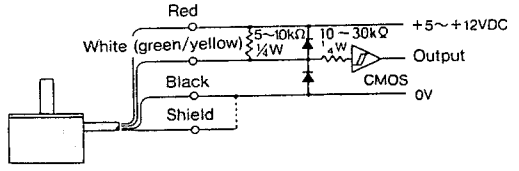
■Typical Wiring Diagrams

Connection with IC circuit
(cable length should be as short as possible)

(1) Connection to TTL/LSTTL



(2) Connection to CMOS



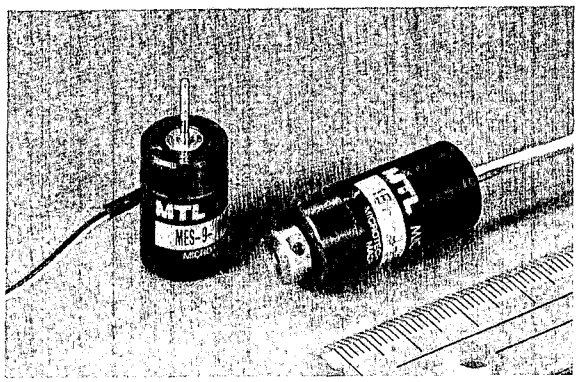
(ME-9-P series only)

■Features

- Smallest, digital output encoder
- Resolution to 1000P/R
- 3channels
- Easy to install on miniature motors (Hollow shaft)
- Special P/R can be made upon request

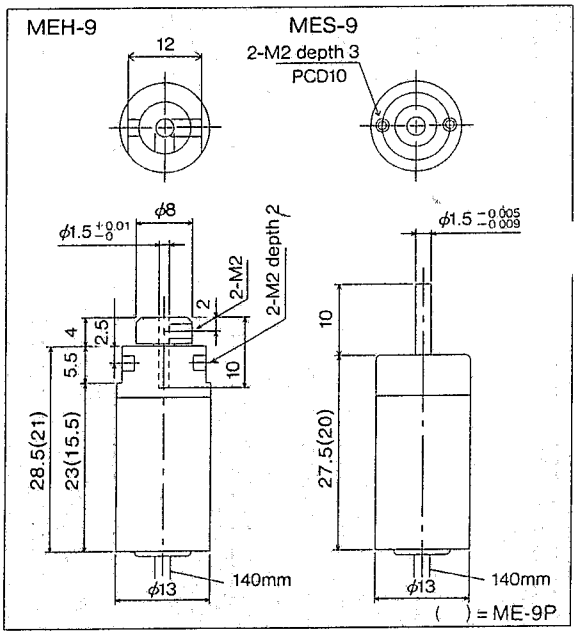
■Typical applications

- Motor Drives, DC servo motors
- X-Y tables
- Medical diagnostic equipment
- Small robotics
- Office products
- Welding Machines



ME-9 series
ME-9-P series NEW

■Dimensions, mm

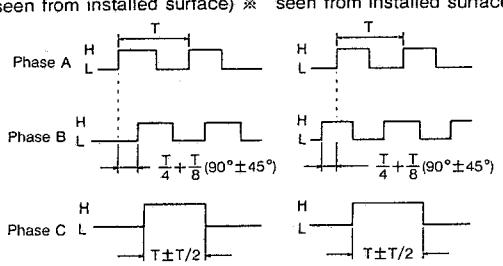


Item \ Type	ME□-9-□	ME□-9-□P
Supply voltage	DC+5V±5%	5V±10%
Current consumption	60mA	40mA
Detection system	Incremental	
Output: Pulses/revolution (standerd)	32 100 200 300 360	300 500 ※1000
Output: Output phase	A,B,Z output	
Output: Output type	Square wave Voltage output only	Square wave Line driver N/A
Output: Output capacity	Sink current 8mA max Residual voltage 0.8V or less(at 5mA)	Sink current 20mA max Residual voltage 0.5V or less(at 10mA)
Output: Maximum frequency response	50kHz	100kHz
Output: Output phase difference	A/B phase difference 90°±45°T/4±T/8 Z phase T±T/2(see output waveform diagram)	
Output: Waveform rise/fall time	2μs or less(output cable 140mm or less)	
Starting torque	≦1×10⁻³N・m(10gf-cm)	
Allowable shaft loading: Radial	1.9N(200g) ※0.9N(100g)	
Allowable shaft loading: Axial	1.9N(200g) ※0.9N(100g)	
Maximum rotational speed	6000min⁻¹	
Operating range temperature /humidity	0℃～+60℃ RH35% to 90%(above the dew point)	
Storage ambient temperature	−20℃～80℃	
Vibration resistance	Endurance 55Hz double anplitude 1.5mm 2 hours each in X, Y and Z directions	
Impact resistance	Endurance 500m/S² (about 50G) 3 times each in X, Y and Z directions	
Cable	Φ3mm Vinyl cable 5-core 1m long Insulated shielded cable	
Weight	12g	10g

■Outputwave forms(ME-9, ME-9P only)

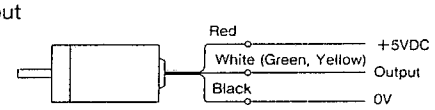
CW rotation(right rotation as seen from installed surface) ※

CCW rotation(right rotation as seen from installed surface) ※

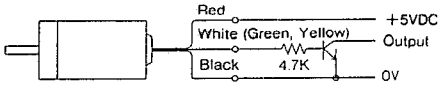


■Typical Wiring Diagrams(ME-9 only)

① Voltage output



② Connection to the outside transistor



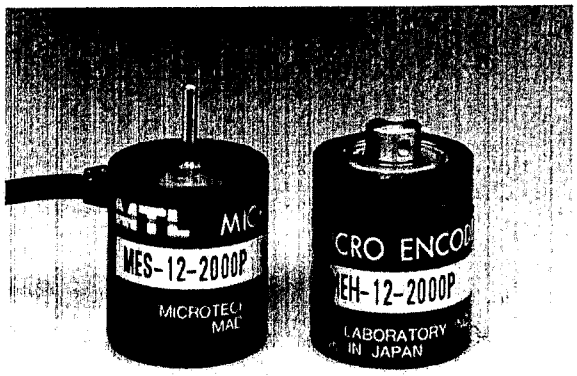
(ME-12-P series only)

■Features

- Smallest, digital output encoder
- Resolution to 2000 P/R
- 3channels
- Easy to install on miniature motors (Hollow shaft)
- Special P/R can be made upon request

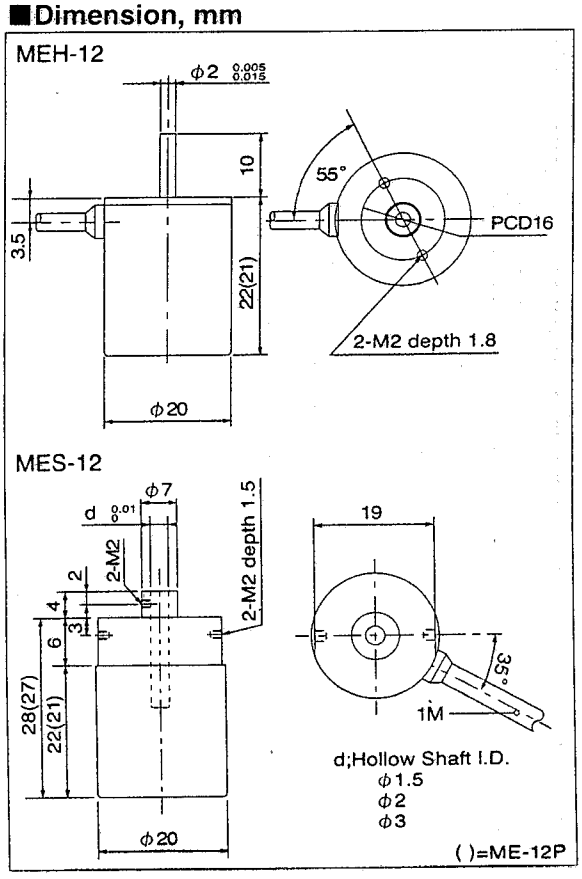
■Typical applications

- Motor Drives, DC servo motors
- X-Y tables
- Medical diagnostic equipment
- Small robotics
- Office products
- Welding Machines



ME-12 series
ME-12-P series NEW

■Dimension, mm



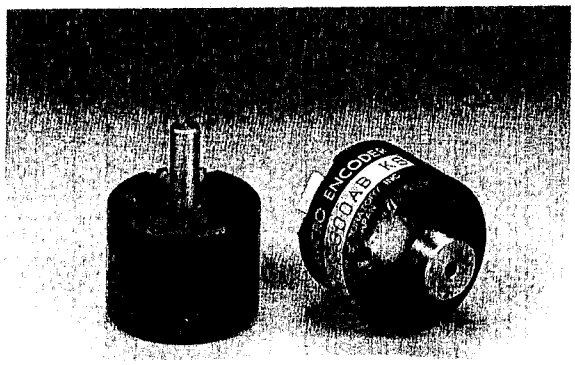
Item \ Type	ME□-12-□	ME□-12-□P
Supply voltage	DC5V±5%	±10%
Current consumption	60mA	40mA
Detection system	Incremental	
Output: Pulses/revolution (standerd)	100 200 256 300 360 500 } Hollow shaft only 900 } Hollow shaft only	500 1000 ※2000
Output: Output phase	A,B,Z output	
Output: Output type	Square wave	
Output: Output capacity	Sink current:20mA Residual voltage:0.5V or less(at 10mA)	
Output: Maximum frequency response	100kHz	
Output: Output phase difference	A/B phase difference 90°±45°T/4±T/8 Z phase T±T/2(see output waveform diagram).	
Output: Waveform rise/fall time	2μs or less(output cable 1m or less)	
Starting torque	1×10N・m(10gf-cm)	
Allowable shaft loading: Radial	1.9N(200g) ※0.9N(100g)	
Allowable shaft loading: Axial	1.9N(200g) ※0.9N(100g)	
Maximum rotational speed	6000min^{-1}	
Operating range temperature /humidity	0℃～+60℃ RH35% to 90%(above the dew point)	
Storage ambient temperature	−20℃～80℃	
Vibration resistance	Endurance 55Hz double anplitude 1.5mm 2 hours each in X, Y and Z directions	
Impact resistance	Endurance 500m/S^2 (about 50G) 3 times each in X, Y and Z directions	
Cable	Φ3mm Vinyl cable 5-core 1m long Insulated shielded cable	
Weight	40g	

■Features

- Smallest & digital output encoder
- Resolution to 500P/R
- 3channels
- Special P/R can be made upon request
- Low cost
- Short delivery lead time

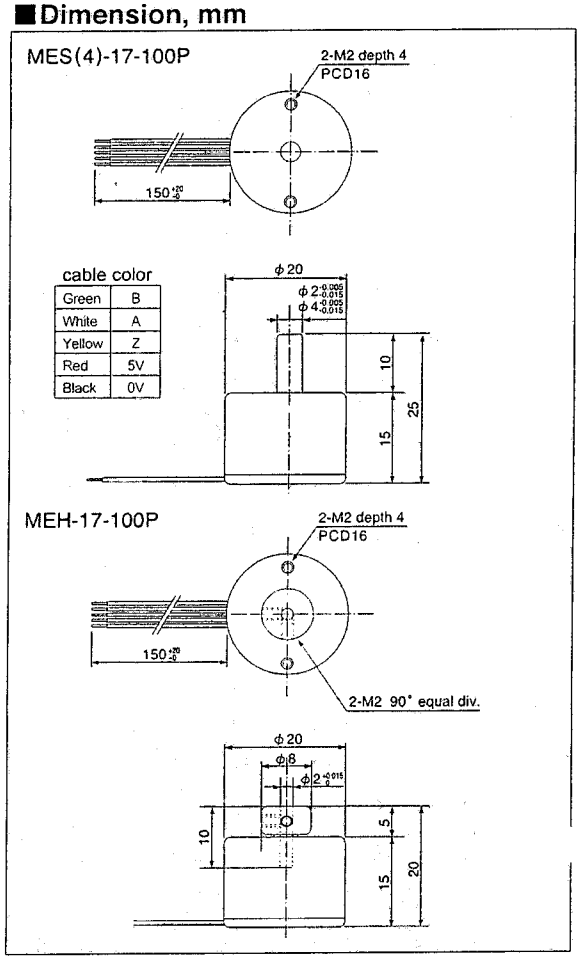
■Typical applications

- Motor Drives DC servo motors
- X-Y tables
- Medical diagnostic equipment
- Small robotics
- Office products
- Welding Machines



ME-17-P series

■Dimension, mm

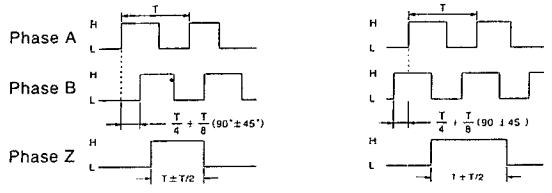


Item \ Type	ME□(2/4)-17-□
Supply voltage	DC5V±10%
Current consumption	≦30mA
Detection system	Incremental
Output: Pulses/revolution (standerd)	100 300 400 200 360 500
Output: Output phase	A.B.Z phase(Z="H")
Output: Output type	Square wave, Voltage output only pull-up resistor 10KΩ
Output: Output capacity	Sink current : 20mA Residual voltage : 0.4V or less
Output: Maximum frequency response	50kHz
Output: Output phase difference	A/Bphase difference 90°±45° T/4±T/8 Z phase T±T/2(see output waveform diagram).
Output: Waveform rise/fall time	2μs or less (output cable 1m or less)
Starting torque	≦1×10^{-3} N·m(10gf-cm)
Allowable shaft loading: Radial	1.9N (200g)
Allowable shaft loading: Axial	1.9N (200g)
Maximum rotational speed	6000min^{-1}
Operating range temperature /humidity	0℃～50℃ RH35 to 90%(above the dew point)
Storage ambient temperature	-20℃～80℃
Vibration resistance	Endurance 55Hz double amplitude 1.5mm 2 hours each in X,Y and Z directions
Impact resistance	Endurance 500m/s^2(about 50G) 3 times each in X,Y and Z directions
Cable	150mm long cable vinyl cable (AWG28)
Weight	20g

■Outputwave forms (ME-17 onry)

CW rotation (right rotation as seen from installed surface)※

CCW rotation (right rotation as seen from installed surface)※



■Features

- Resolution to 2500 P/R, digital output
- Thin, compact and light weight (ϕ32mm diameter, 22mm height)
- Economical
- Single, hollow or double shaft available
- Custom-made (Special shaft or P/R, etc.) is available by request
- Short delivery lead time

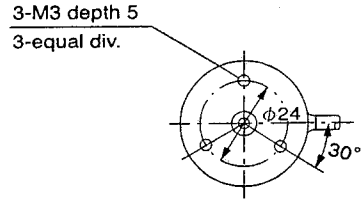
■Typical applications

- Servo motors
- Robots
- NC machines (lathe, etc.)
- Digital plotters
- X-Y tables
- Plotters
- Injection machines
- Rotary tables
- Cutting machines
- IC bonders
- Medical equipments
- Valve controls
- Tape speed control
- Pulse generators
- Coil winders

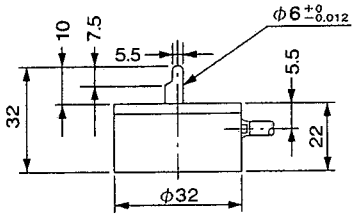
ME-20-P series

■Dimensions, mm

MES-20-P

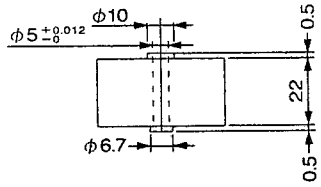


Hollow shaft I.D.



MEH-20-P

Hollow shaft I.D.



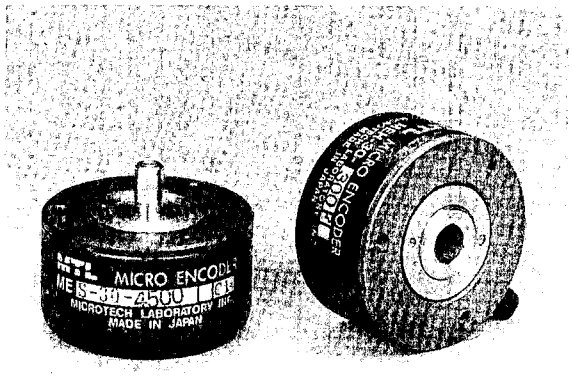
Item \ Type	ME□-20-□P	
Supply voltage	DC5～12V±10% DC24V±10%(Open collector only)	
Current consumption	≦50mA	
Detection system	Incremental	
Output: Pulses/revolution (standard)	50 400 600 1800 60 500 800 2000 100 1000 2048 200 1024 2500 250 1200 256 300 360	
Output: Output phase	A,B,Z phase	
Output: Output type	Square wave	
Output: Output capacity	Sink current: 20mA Residual voltage:0.5V or less (at 10mA)	
Output: Maximum frequency response	100kHz	
Output: Output phase difference	A/B phase difference 90°±45°T/4±T/8 Z phase T±T/2 (see output waveform diagram).	
Output: Waveform rise/fall time	2μs or less (output cable 1m or less)	
Starting torque	≦2×10^{-3}N·m(20gf-cm)	
Allowable shaft loading: Radial	19.6N (2kg)	14.7N (1.5kg)
Allowable shaft loading: Axial	9.8N (1kg)	4.9N (0.5kg)
Maximum rotational speed	6000min^{-1}	
Operating range temperature /humidity	−10℃～70℃ RH35 to 90%(above the dew point)	
Storage ambient temperature	−20℃～80℃	
Vibration resistance	Endurance 55Hz double amplitude 1.5mm 2 hours each in X, Y and Z directions	
Impact resistance	Endurance 500m/S^2(about 50G) 3 times each in X, Y and Z directions	
Cable	ϕ4.2mm 4-core(5-core) Insulated Shielded vinyl, 1m long	
Weight	70g	

■Features

- Resolution to 4500 P/R, digital output
- A, B and Z 3 channels
- Thin, compact and light weight (φ44mm diameter, 22mm height)
- Economical
- Single, hollow or double shaft available
- Custom-made (Special shaft or P/R, etc.) is available by request
- Short delivery lead time

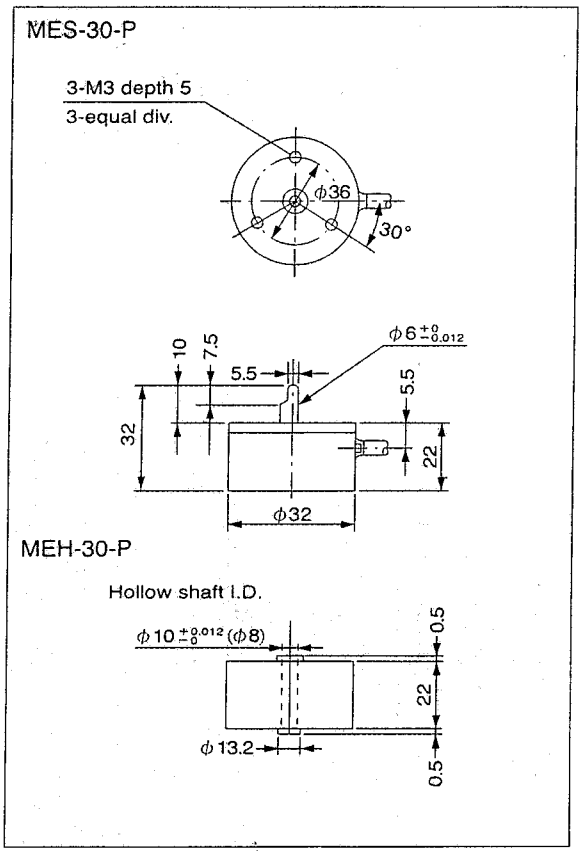
■Typical applications

- Servo motors
- Robots
- NC machines (lathe, etc.)
- X-Y tables
- Rotary tables
- Overhead cranes
- Plotters
- Automatic storage and retrieval systems
- Elevators
- IC bonders
- Semiconductor chip mounters
- Coil winders
- Conveyors
- Cutting machines



ME-30-P series

■Dimensions, mm



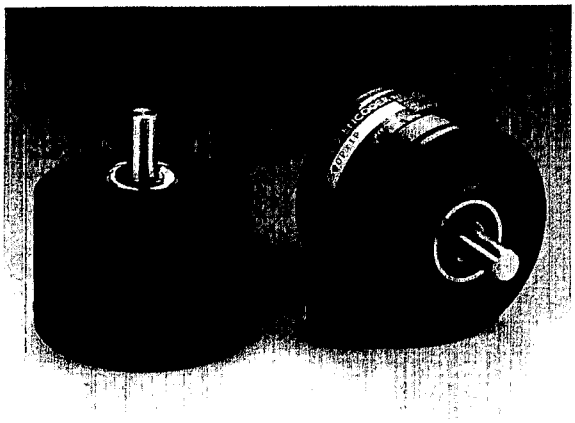
Item \ Type	ME□-30-□P			
Supply voltage	DC5～12V ± 10% DC24V ± 10%(Open collector only)			
Current consumption	≦50mA			
Detection system	Incremental			
Output: Pulses/revolution (standard)	100 200 250 300 360 400 450	500 600	800 1000 1024 1200 1500 1800 2000 2048	2500 3600 4500
Output: Output phase	A,B,Z phase			
Output: Output type	Square wave			
Output: Output capacity	Sink current: 20mA Residual voltage:0.5V or less (at 10mA)			
Output: Maximum frequency response	100kHz			
Output: Output phase difference	A/B phase difference 90°±45°T/4±T/8 Z phase T±T/2 (see output waveform diagram).			
Output: Waveform rise/fall time	2μs or less (output cable 1m or less)			
Starting torque	≦3×10⁻³N·m(30gf-cm)			
Allowable shaft loading: Radial	19.6N (2kg)		9.8N (1kg)	
Allowable shaft loading: Axial	9.8N (1kg)		4.9N (0.5kg)	
Maximum rotational speed	6000min⁻¹			
Operating range temperature /humidity	−10℃～70℃ RH35 to 90%(above the dew point)			
Storage ambient temperature	−20℃～80℃			
Vibration resistance	Endurance 55Hz double amplitude 1.5mm 2 hours each in X, Y and Z directions			
Impact resistance	Endurance 500m/S² (about 50G) 3 times each in X,Y and Z directions			
Cable	φ4.2mm 5-core Insulated Shielded vinyl, 1m long			
Weight	140g			

■Features

- Resolution to 10000P/R digital output
- 3channels
- Heavy-Duty Type
- Custom-made (special P/R、Dripping proof) is available by request
- Short delivery lead time

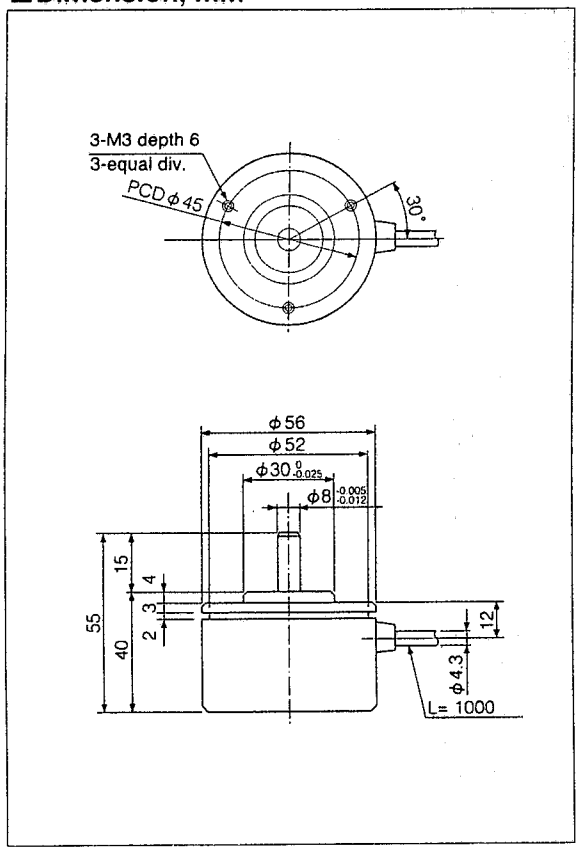
■Typical applications

- Machine tools
- Industrial robots
- IC bonders
- Rotary tables
- Test and measurement equipment
- Semiconductor chip mounters
- Laboratory use
- Elevators
- Injection machines
- Bending machines
- Conveyor systems
- X-Y tables



MES-40-P series

■Dimension, mm



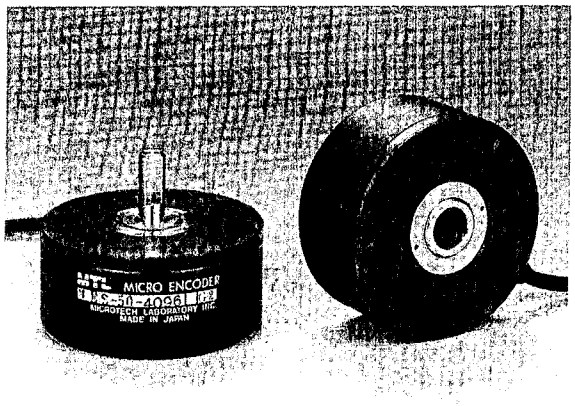
Item \ Type	MES-40-□P
Supply voltage	DC5～12±10% DC24±10% (Open collector only)
Current consumption	≦40mA
Detection system	Incremental
Output: Pulses/revolution (standard)	100 1000 200 1024 300 2000 360 3600 400 4000 500 5000 600 10000
Output: Output phase	A.B.Z phase
Output: Output type	Square wave
Output: Output capacity	Sink current : 20mA Residual voltage : 0.5V or less (at 10mA)
Output: Maximum frequency response	100kHz
Output: Output phase difference	A/Bphase difference 90°±45° T/4±T/8 Z phase T±T/2(see output waveform diagram)
Output: Wave rise/fall time	2μs or less (output cable 1m or less)
Starting torque	≦2×10^{-3} N·m(20gf-cm) ≦5×10^{-3} N·m(50gf-cm) [Dripping proof]
Allowable shaft loading: Radial	49N (5kg)
Allowable shaft loading: Axial	29.4N (3kg)
Maximum rotational speed	6000min^{-1}
Operating range temperature /humidity	-10℃～70℃ RH35% to 90%(above the dew point)
Storage ambient temperature	-20℃～80℃
Vibration resistance	Endurance 55Hz double amplitude 1.5mm 2 hours each in X,Y and Z directions
Impact resistance	Endurance 500m/s^2 (about 50G) 3 times each in X,Y and Z directions
Cable	φ4.2mm 5-core lasulated Shielded vinyl,1m long
Weight	200g

■Features

- Resolution to 10800 P/R, digital output
- A, B and Z 3 channels
- Thin and compact body (ϕ65mm diameter, 30mm height)
- Single, hollow on double shaft available
- Custom-made models (Special shaft or P/R, etc.) are available by request
- Short delivery lead time

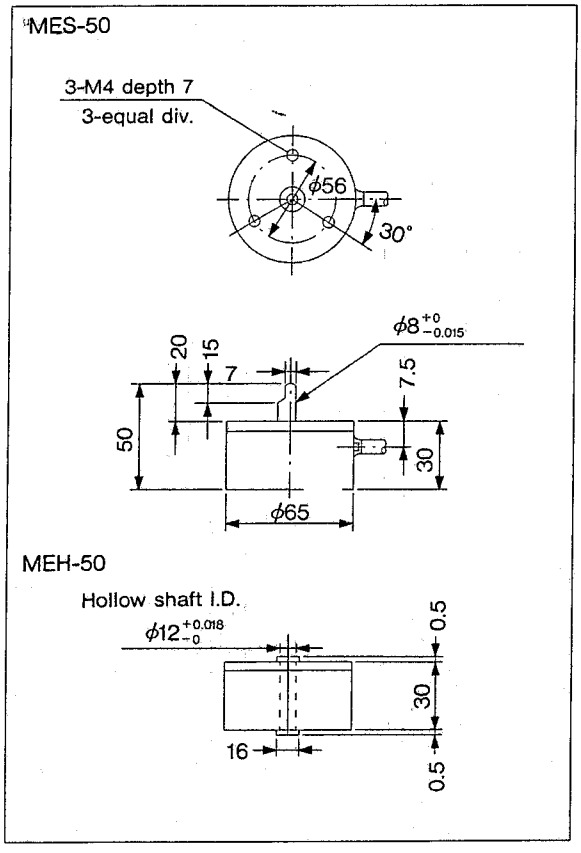
■Typical applications

- Machine tools
- Industrial robots
- IC bonders
- Rotary tables
- Test and measurement equipment
- Semiconductor chip mounters
- Laboratory use
- Elevators
- Injection machines
- Bending machines
- Conveyor systems
- X-Y tables
- Antenna



ME-50 series

■Dimensions, mm



Item \ Type	ME□-50-□	
Supply voltage	DC5～12V±10% DC24V±10%(Open collector only)	
Current consumption	≦60mA	
Detection system	Incremental	
Output: Pulses/revolution (standard)	500 3000 1000 3600 1024 4096 2000	5000 5400 6000 10000 10800
Output: Output phase	A,B,Z phase	
Output: Output type	Square wave	
Output: Output capacity	Sink current: 20mA Residual voltage: 0.5V or less (at 10mA)	
Output: Maximum frequency response	100kHz	
Output: Output phase difference	A/B phase difference 90°±45°T/4±T/8 Z phase T±T/2 (see output waveform diagram).	
Output: Waveform rise/fall time	2μs or less (output cable 1m or less)	
Starting torque	≦10×10⁻³N·m(100gf-cm)	
Allowable shaft loading: Radial	19.6N (2kg)	9.8N (1kg)
Allowable shaft loading: Axial	9.8N (1kg)	4.7N (0.5kg)
Maximum rotational speed	6000min⁻¹	
Operating range temperature /humidity	0°C～60°C RH35 to 90% (above the dew point)	
Storage ambient temperature	−20°～80°C	
Vibration resistance	Endurance 55Hz double amplitude 1.5mm 2 hours each in X, Y and Z directions	
Impact resistance	Endurance 500m/S² (about 50G) 3 times each in X, Y and Z directions	
Cable	ϕ4.2mm 5-core Insulated Shielded vinyl, 1m long	
Weight	220g	

■Features

- Resolution to 9000 P/R, digital output (possible to 21600 P/R)
- Wide hollow diameter 30mm, thickness 30mm
- Custom-made models (Special hollow dia. or P/R) are available by request
- Short delivery lead time

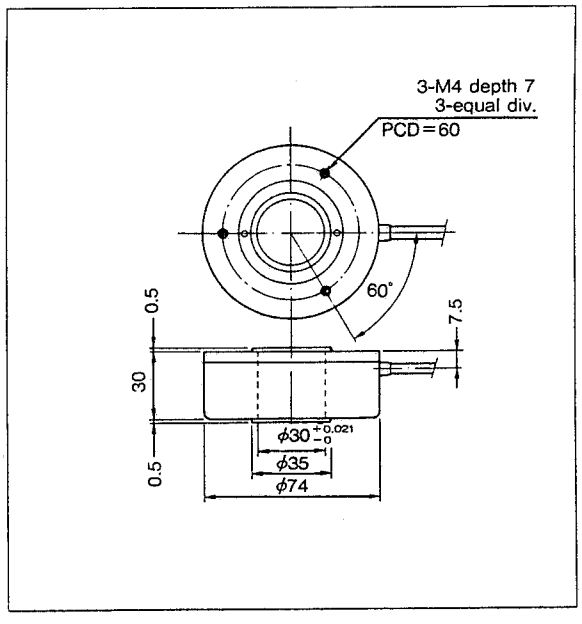
■Typical applications

- Lathes
- Index tables
- Wire, die bonders
- Steering torque/angle sensing
- Valve controls
- Robotics
- Testing and measuring systems
- Semiconductor chip mounters
- Balance machines
- Telescopes
- Laboratory use
- Radar
- X-Y tables

MEH-60 series

Item \ Type	ME□-60-□	
Supply voltage	DC5～12V 10%(※5V only) DC24V 10%(Open collector only)	
Current consumption	≦60mA	※≦120mA
Detection system	Incremental	
Output: Pulses/revolution (standard)	180 600 200 1000 360 400 500	1800 2000 4000 5000 5400 9000 10000 10800 ※21600
Output: Output phase	A,B,Z phase	
Output: Output type	Square wave	
Output: Output capacity	Sink current: 20mA Residual voltage:0.5V or less (at 10mA)	
Output: Maximum frequency response	100kHz	
Output: Output phase difference	A/B phase difference 90°±45°T/4±T/8 Z phase T±T/2 (see output waveform diagram).	
Output: Waveform rise/fall time	2μs or less (output cable 1m or less)	
Starting torque	≦20×10⁻³N·m(200gf-cm)	
Allowable shaft loading: Radial	19.6N (2kg)	9.8N (1kg)
Allowable shaft loading: Axial	9.8N (1kg)	4.9N (0.5kg)
Maximum rotational speed	1000min⁻¹	
Operating range temperature /humidity	0°C～60°C ※0°C～50°C RH35 to 90% (above the dew point)	
Storage ambient temperature	−20°～80°C	
Vibration resistance	Endurance 55Hz double amplitude 1.5mm 2 hours each in X, Y and Z directions	
Impact resistance	Endurance 500m/S² (about 50G) 3 times each in X, Y and Z directions	
Cable	φ4.2mm 5-core Insulated Shielded vinyl, 1m long	
Weight	320g	※430g

■Dimensions, mm

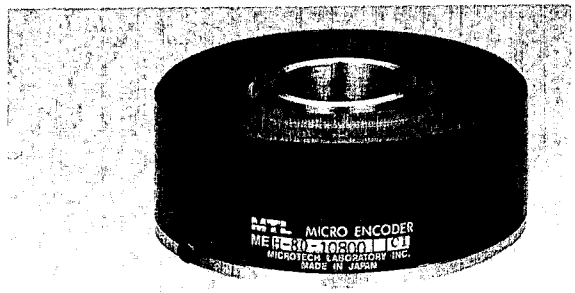


■Features

- Resolution to 21600 P/R, digital output
- Wide hollow diameter 36mm
- High resolution and accuracy
- Possible to 0.01°, 0.005° or 15sec reading

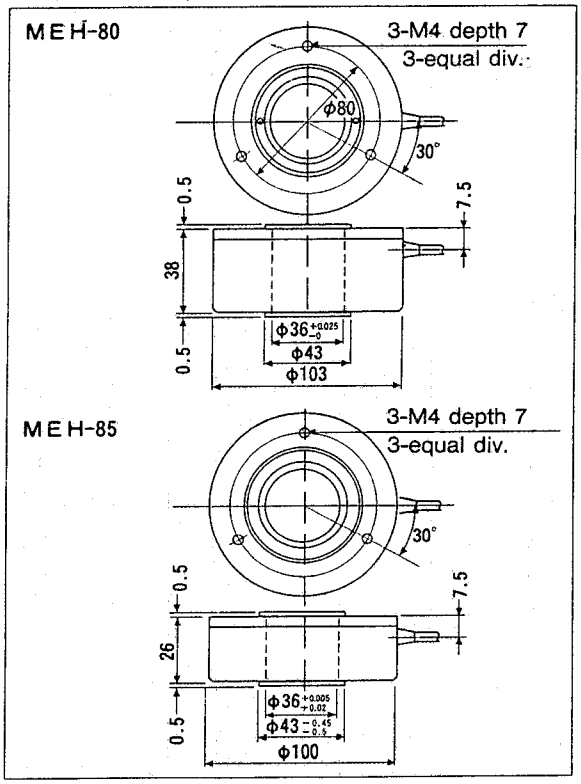
■Typical applications

- Index tables
- Testing equipments
- High performance measuring equipments
- Laboratory use
- Gyroscopes
- Telescopes
- Wire, die bonders
- NC machines
- Robots
- Precise position controls
- Radar



MEH-80 series
MEH-85 series

■Dimensions, mm



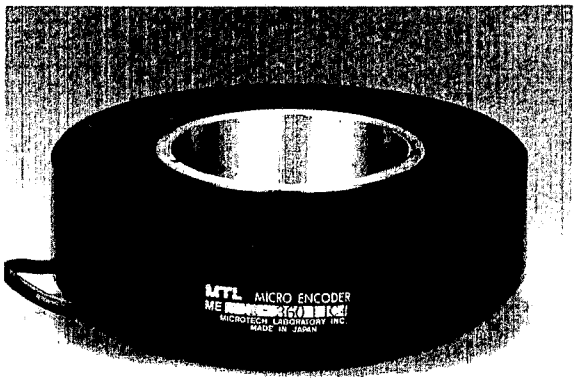
Item \ Type	MEH-80-□	MEH-85-□
Supply voltage	DC5～12V ± 10% DC24V ± 10%(Open collector only)	
Current consumption	≦60mA	
Detection system	Incremental	
Output: Pulses/revolution (standard)	600 1000 1500 18000 ※21600	500 7200 1000 11250 1024 18000 3600 20250 4500 21600 5400
Output: Output phase	A,B,Z phase ※A,B phase	
Output: Output type	Square wave	
Output: Output capacity	Sink current: 20mA Residual voltage: 0.5V or less (at 10mA)	
Output: Maximum frequency response	100kHz	
Output: Output phase difference	A/B phase difference 90 °±45 °T/4±T/8 Z phase T±T/2 (see output waveform diagram).	
Output: Waveform rise/fall time	2μs or less (output cable 1m or less)	
Starting torque	≦40×10⁻³N·m(400gf-cm)	
Allowable shaft loading: Radial	14.7N (1.5kg)	9.8N (1kg)
Allowable shaft loading: Axial	4.7N (0.5kg)	4.7N (0.5kg)
Maximum rotational speed	1000min⁻¹	
Operating range temperature /humidity	0°C～60°C RH35 to 90% (above the dew point)	
Storage ambient temperature	−20°C～80°C	
Vibration resistance	Endurance 55Hz double amplitude 1.5mm 2 hours each in X, Y and Z directions	
Impact resistance	Endurance 500m/S² (about 50G) 3 times each in X, Y and Z directions	
Cable	φ4.2mm 5-core Insulated Shielded vinyl, 1m long	
Weight	630g	520g

■Features

- Resolution to 32400 P/R, digital output
- Wide hollow diameter 60mm or 75mm
- High resolution and accuracy
- The sine wave models work with MT series

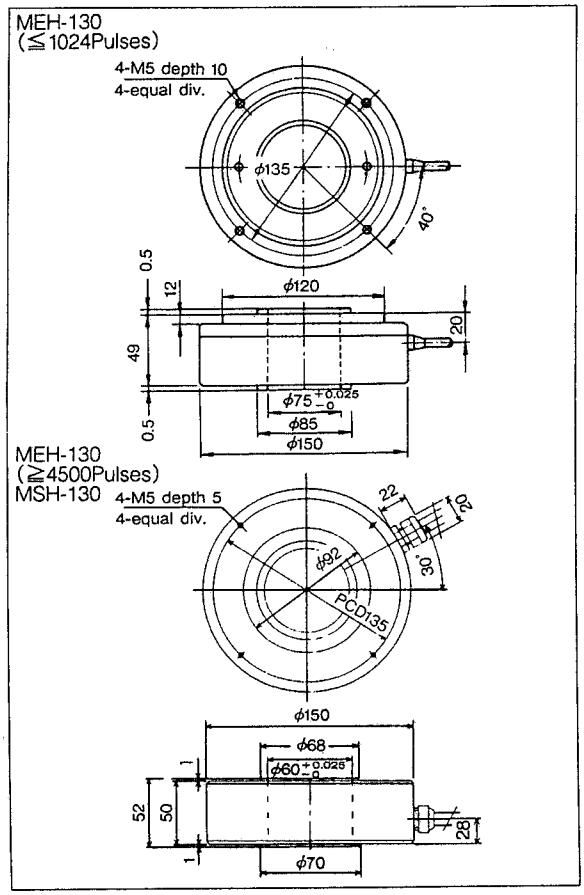
■Typical applications

- High performance measuring equipments
- Testing equipments.
- Index tables
- Precise position controls
- Laboratory use
- Telescopes



MEH-130 series
MSH-130 series

■Dimensions, mm



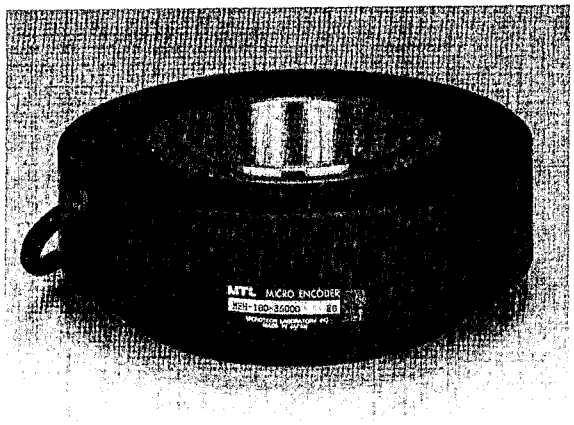
Item \ Type	MEH-130-□	MSH-130-□
Supply voltage/ Current consumption	DC5V～12V ±10% ※DC24V ±10% (Open collector only) 60mA～150mA	3 power supply ±DC15V±10%≦0.3A +DC5V +10% −5% ≦0.6A
Detection system	Incremental	
Output: Pulses/revolution (standard)	360 600 1024 4500 20250 25000 28125	4500 5000 11250 20250 25000 28125 ※32400
Output: Output phase	A,B,Z phase	※A,B phase
Output: Output type	Square wave	Sine wave
Output: Output capacity	Sink current: 20mA Residual voltage: 0.5V or less (at 10mA)	10Vp-p±10mA
Output: Maximum frequency response	100kHz	30kHz
Output: Output phase difference	A/B phase difference 90 °±45 °T/4±T/8 Z phase T±T/2 (see output waveform diagram).	
Output: Waveform rise/fall time	2μs or less (output cable 1m or less)	———
Starting torque	≦50×10⁻³N·m(500gf-cm)	
Allowable shaft loading: Radial	19.6N (2kg)	
Allowable shaft loading: Axial	9.8N (1kg)	
Maximum rotational speed	1000min⁻¹	
Operating range temperature /humidity	0°C～60°C RH35 to 90% (above the dew point)	
Storage ambient temperature	−20°C～80°C	
Vibration resistance	Endurance 55Hz double amplitude 1.5mm 2 hours each in X, Y and Z directions	
Impact resistance	Endurance 500m/S² (about 50G) 3 times each in X, Y and Z directions	
Cable	φ4.2mm 5-core Insulated Shielded vinyl, 1m long	φ8 7-core vinyl Insulated Shielded cable, 1m long
Weight	3kg	

■Features

- Resolution to 54000P/R digital output
- Wide hollow diameter 90mm
- High resolution and accuracy

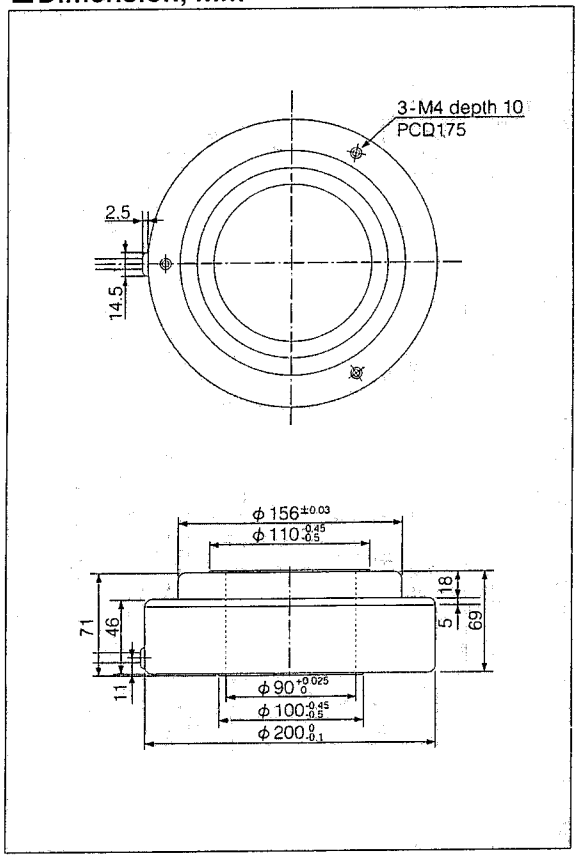
■Typical applications

- High performance measuring equipments
- Testing equipments
- Index tables
- Precise position controls
- Laboratory use
- Telescopes
- Gyroscopes



MEH-180 series

■Dimension, mm

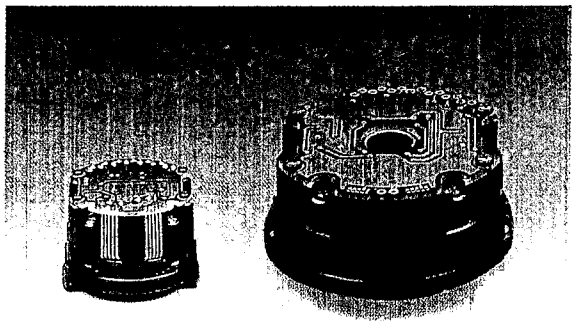


Item \ Type	MEH-180-□
Supply voltage/ Current consumption	3 power supply DC±15V ±10% ≦0.2A DC+5V +10% -5% ≦0.2A
Detection system	Incremental
Output: Pulses/revolution (standard)	36,000 54,000
Output: Output phase	A.B.Z phase
Output: Output type	Square wave Line driver
Output: Output capacity	V_{OL}=0.5Vmax V_{OH}=2.5Vmin I_O=±20mA
Output: Maximum frequency response	300kHz
Output: Output phase difference	A/Bphase difference 90°±45° T/4±T/8 Z phase T±T/2(see output waveform diagram).
Output: Waveform rise/fall time	0.5 μs or less (output cable 1m or less)
Starting torque	≦80×10^{-3} N·m(800gf-cm)
Allowable shaft loading: Radial	29.4N (3kg)
Allowable shaft loading: Axial	19.6N (2kg)
Maximum rotational speed	300min^{-1}
Operating range temperature /humidity	0℃～50℃ RH35 to 90%(above the dew point)
Storage ambient temperature	-20℃～80℃
Vibration resistance	Endurance 55Hz double amplitude 1.5mm 2 hours each in X,Y and Z directions
Impact resistance	Endurance 500m/s^2 (about 50G) 3 times each in X,Y and Z directions
Cable	φ8mm Shielded vinyl 1m long
Weight	5kg

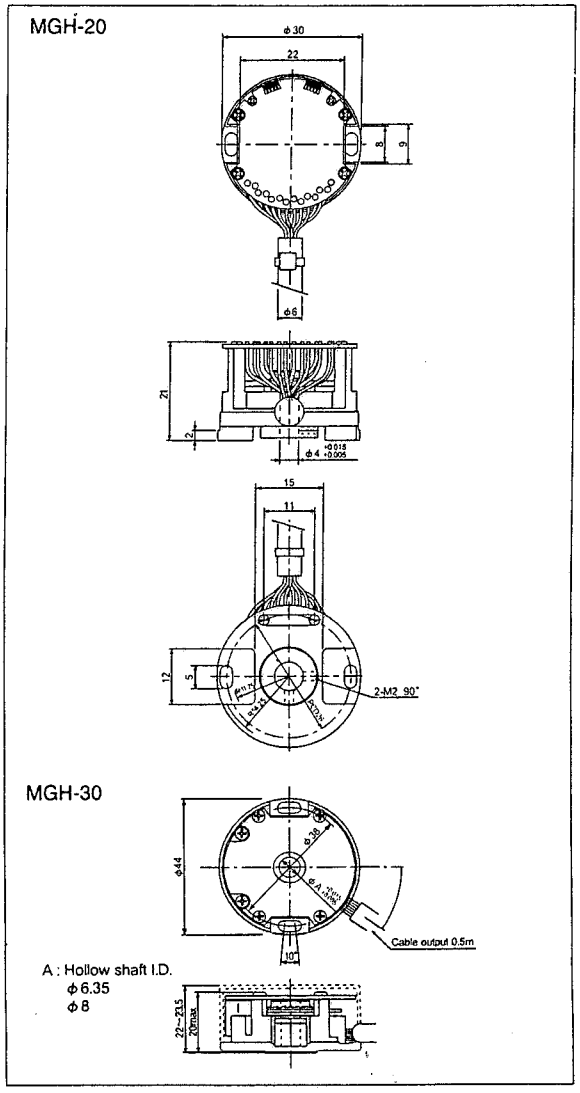
MG series (MODULAR TYPE)

■Features

- Compact and highperformance
- Easy to install on motors
- Commutation tracks available on MGH-20 on 500, 1000 and 1024 Pulse/rev.
- Commutation tracks available on MGH-30 on 1000, 1024 and 2000 Pulse/rev.



■Dimension, mm



Item \ Type	MGH-20-□-E	MGH-30-□-E
Supply voltage	DC5V±10%	
Current consumption	≦60mA(at no load)	
Detection system	Incremental	
Output: Pulses/revolution (standerd.)	100 450 1024 200 500 *1024 250 *500 1200 256 600 300 800 360 1000 400 *1000	100 500 1200 200 600 1500 250 800 1800 300 *1000 2000 360 1000 *2000 400 1024 450 *1024
Output: Output phase	A.$\overline{A}$.B.$\overline{B}$.Z.$\overline{Z}$ ＊Commutation signals (U.$\overline{U}$.V.$\overline{V}$.W.$\overline{W}$)	
Output: Output type	Square wave Line driver	
Output: Output capacity	V_{OL}=0.5Vmax V_{OH}=2.5Vmin I_O=±20mA	
Output: Maximum frequency response	150kHz	
Output: Output phase difference	A/B phase difference 90° ±45°(T/4±T/8) Z phase T±T/2 U.V.W. 4hole 120° phase difference 3 signals	
Output: Waveform rise/fall time	≦2μs	
Maximum rotational speed	6000min^{-1}	
Operating range temperature /humidity	0℃～60℃ RH35%～90% (above the dew point)	
Storage ambient temperature	-20℃～80℃	
Vibration resistance	Equivalent to ME series	
Impact resistance	Equivalent to ME series	
Cable	Φ6.8mm 19-core Insulate shielded vinyl, 0.5m long	
Weight	60g	100g

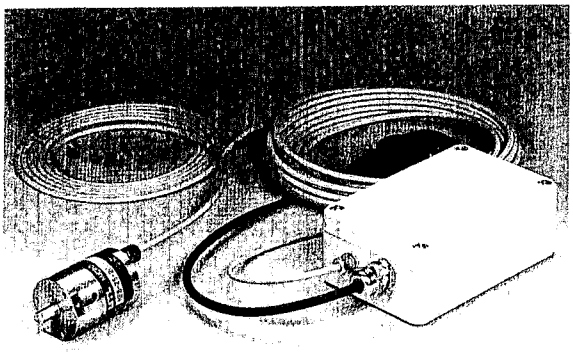
■Dimension, mm

MGH-20	Pulse	100～200	250～600	800～1200
MGH-30	Pulse	100～300	400～1024	1200～2000
Allowable eccentricity	Radial	±0.05mm		±0.02mm
	Axial	±0.2mm	±0.1mm	±0.05mm

MF series (micro fiber encoder)

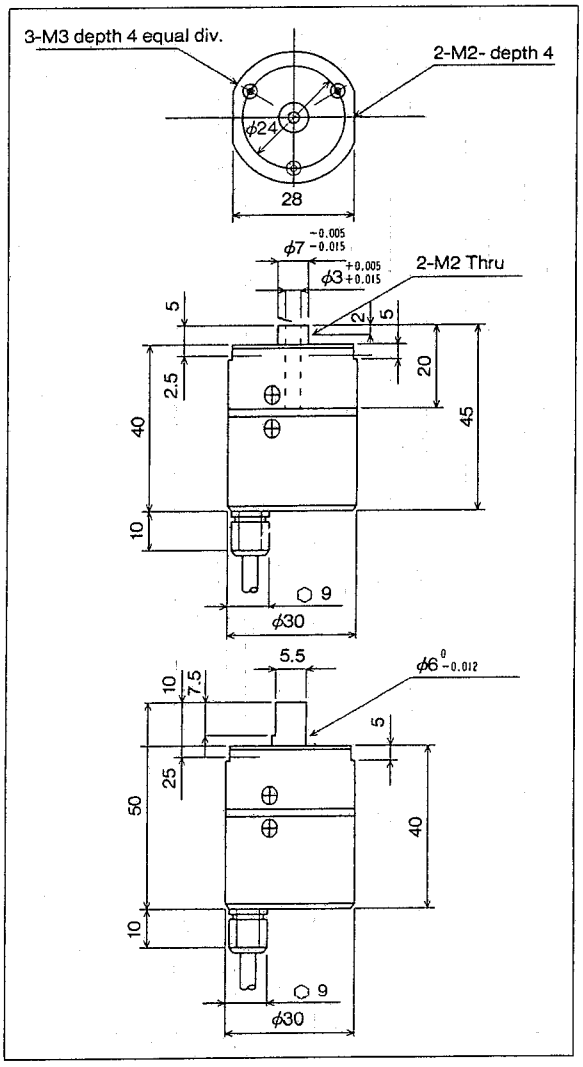
■Features

- Compact encoder with 8-core fiber cable.
- ϕ3mm fiber cables connect 'Encoder' and 'Photoelectric transfer'.
- The fiber cables are thin and light weight.
- Easy to install the micro fiber encoder.
- ϕ12mm middle connector can easily be attached or removed.
- Optical fiber cables are insulation, so they are not influenced by explosion-proof, high voltage, and noise.
- There are 'Shaft type' and 'Hollow shaft type' models.
- Easy to install on miniature motors. (Hollow shaft)
- Protection from environment Encoder:IP55, Photoelectric transfer:IP65
- Optical fiber cable extension:70m max.
- Special P/R can be made upon request.

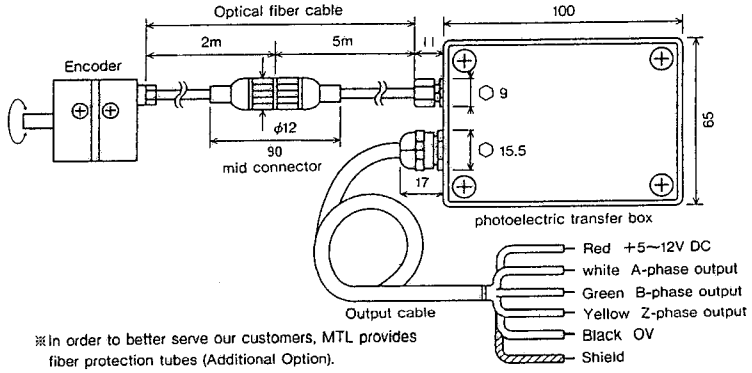


Item \ Type		MF□-25-□	
		Encoder	Photoelectric transfer
Supply voltage		—	DC5V~12V ±10%
Current consumption		—	≦300mA
Detection system		Incremental	—
Output	Pulses/revolution	100,500,900,1000,2000	—
	Output phase	A,B,Z phase	—
	Output type	—	Square wave
	Output capacity	—	Sink current:20mA Residual voltage:0.5V or less(at 10mA)
	Maximum frequency response	—	100KHz
	Output phase difference	—	A/B phase difference 90°±45°T/4±T/8 Z phase T±T/2
	Waveform rise/fall time	—	2μs or less (output cable 1m or less)
Starting torque		≦3×10^{-3}N·m(30gf-cm)	—
Allowable shaft loading	Radical	19.6N (2kg)	—
	Axial	9.8N (1kg)	—
Maximum rotational speed		6000min^{-1}	—
Operating range temperature/humidity		-10°C~+70°C RH35 to 95%	
Storage ambient temperature		-20°C~+80°C	
Vibration resistance		Endurance 55Hz double amplitude. 1.5mm 2 hours each in X, Y and Z directions	
Impact resistance		Endurance 500m/s² (about 50G) X, Y and Z directions	
Fiber cable		Diameter ϕ3mm 2m	Diameter ϕ3mm 5m
		8-core fiber cable jacketed PVC	
Cable		—	Diameter ϕ4.2mm 5-core vinyl cable Insulated shielded cable
Weight		145g	345g

■Dimensions, mm



■Structure

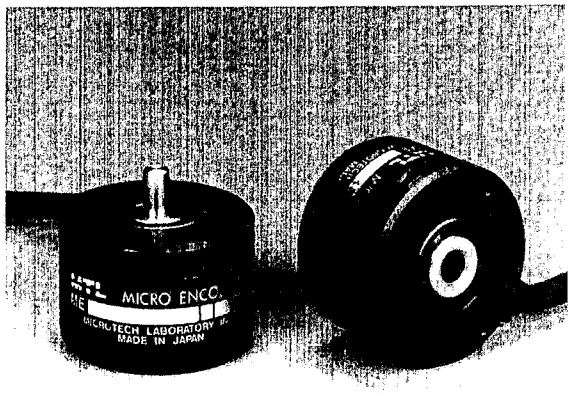


※In order to better serve our customers, MTL provides fiber protection tubes (Additional Option).

MA series (Absolute encoders)

■Features

- Compact, thin and space-saving design with 3 different shaft types (single, hollow or double shaft).
- Protection from environment, IP65
- 0.1° reading is possible on MA-50-3600B

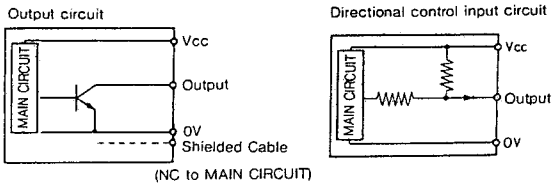


■Cable assignment

Cables \ Type	MA□-36-256G	MA□-36-256N
Black	0V(COMMON)	
Red	Power supply	
Brown	NC	Dir.Cont.
Orenge	Output2^0	
Orange/Black	Output2^1	
Yellow	Output2^2	
Yellow/Black	Output2^3	
Green	Output2^4	
Green/Black	Output2^5	
Blue	Output2^6	
Blue/Black	Output2^7	

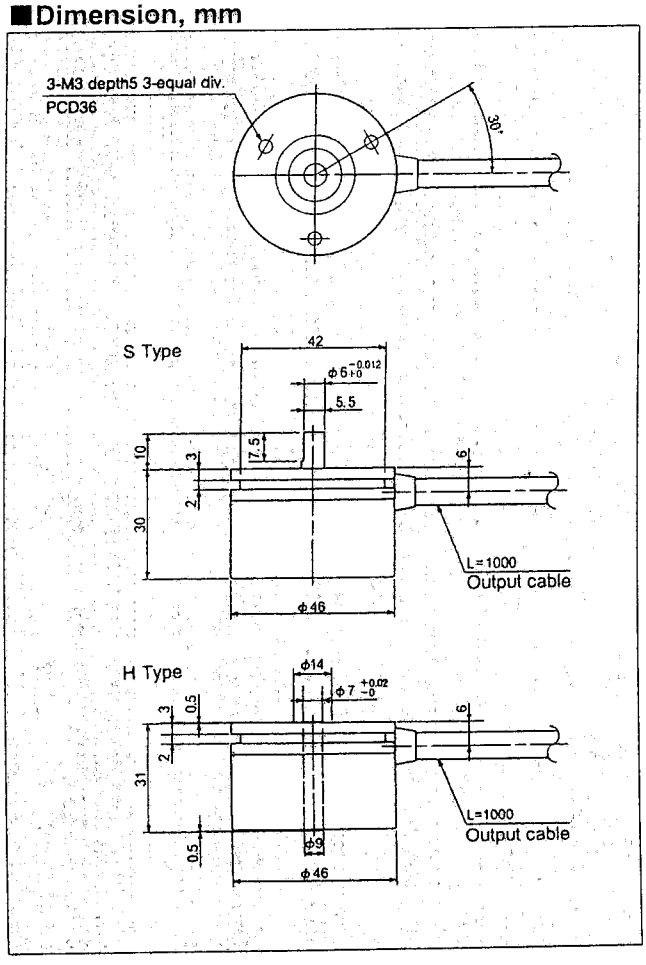
MA-36 series

Input/output circuit



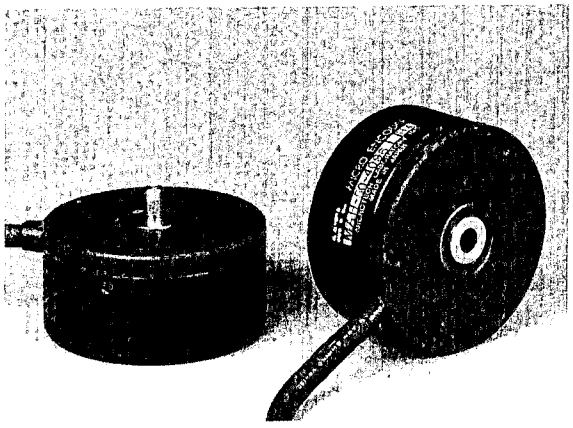
Item \ Type		MA-□-36-□□□
Supply voltage		3 : DC+5～12V±10% 4 : DC+24V±10%
Current consumption		Less than 70mA
Output code		G : Gray code N : Pure binary code
Logic		Negative logic (H=0、L=1)
Resolution		256 (8bits)
Output cricuit		NPN open collector
Allowable shaft loading	Radial	19.6N (2kg)
	Axial	9.8N (1kg)
Maximum rotational speed		6000min^{-1}
Max.frequency response		10kHz
Operating temperature		0℃～+60℃
Storage temperature		-20℃～80℃
Vibration resistance		Endurance 55Hz double amplitude1.5mm 2 hours in X,Y and Z directions
Shock resistance		Endurance 500m/s^2 (50G) 3 times each in X,Y and Z directions
Cables		Diameter ϕ6.0m 11-core vinyl Shielded 1meter
Weight		180g

■Dimension, mm



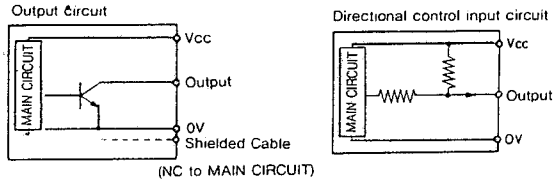
■Typical applications of MA series

- Textile machines
- Level control systems
- Radars
- Press controls
- Printing machines
- Robots
- Packaging machines
- Antennas
- Medical equipments
- Dynamic balancing testers
- Testing equipment



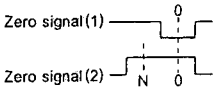
MA-50 series

Input/output circuit



■Cable assignment

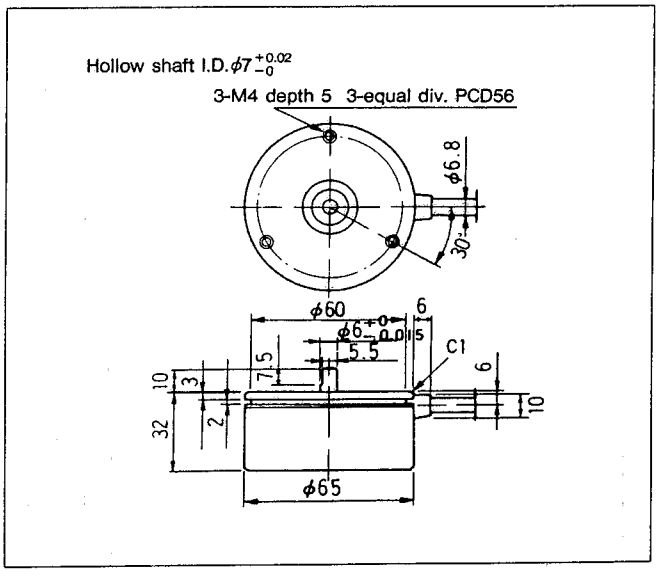
Type / Cables	MA□-50-4096G / MA□-50-4096N	MA□-50-3600B	MA□-50-1000B
Black	0V (COMMON)		
Red	Power supply		
Red/Black	CW or CCW directional control		
Brown	Output2^0		
Brown/Black	Output2^1		
Orange	Output2^2		
Orange/Black	Output2^3		
Yellow	Output2^4	Output$2^0\times10$	
Yellow/Black	Output2^5	Output$2^1\times10$	
Green	Output2^6	Output$2^2\times10$	
Green/Black	Output2^7	Output$2^3\times10$	
Blue	Output2^8	Output$2^0\times100$	
Blue/Black	Output2^9	Output$2^1\times100$	
Purple	Output2^{10}	Output$2^2\times100$	
Purple/Black	Output2^{11}	Output$2^3\times100$	
Grey	Odd parity	Output$2^0\times1000$	NC
Grey/Black	NC	Output$2^1\times1000$	NC
White	Origin point(2) output		
White/Black	Origin point(1) output		



N is last address(4095,3559,999)

Item \ Type	MA□-50-□□□	
Supply voltage	1:DC+5V±10% 2:DC+12V±10% 4:DC+24V±10%	
Current consumption	Less than 100mA	
Output code	G: Gray code N: Pure binary code	B: BCD code
Logic	Negative logic (H=0, L=1)	
Resolution	4096	3600, 1000
Output circuit	NPN open collector	
Allowable shaft loading — Radial	19.6N (2kg)	
Allowable shaft loading — Axial	9.8N (1kg)	
Maximum rotational speed	6000min^{-1}	
Max. frequency response	10KHz	
Operating temperature	0°C～+60°C	
Storage temperature	−20°C～+80°C	
Vibration resistance	Endurance 55Hz double amplitude 1.5mm/2 hours in X, Y and Z directions	
Shock resistance	Endurance 500m/S^2(50G) 3 times each in X, Y and Z directions	
Cables	Diameter φ6.8mm 19-core vinyl Shielded 1meter	
Weight	300g	

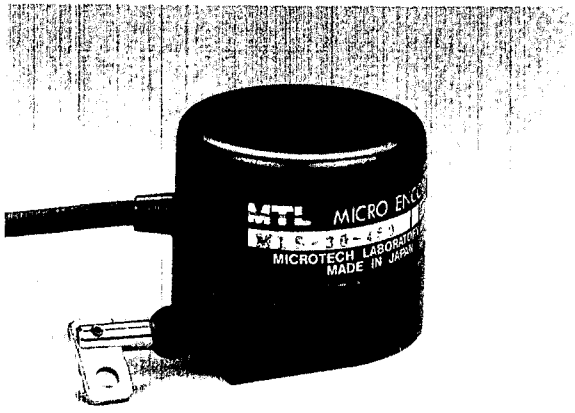
■Dimensions, mm



MLS series (micro linear scale)

Features

- The micro linear scale encoder combines a rotary encoder with a wire-reel mechanism and outputs pulses in accordance with the wire movements, suitable to measure a linear motion. This can be read on the display(in mm) when the encoder is configured with the counter DC series.
- Compact, light-weight, high resolution and wide measurement range.
- Wire length of 500 1000 2000 3000 4000 5000 6500~15000mm.
- Minimal reading unit of 0.01, 0.1, 1mm(on the counter).
- Resolution of linear scale encoder 0.02 or 0.2mm on the MLS-30. (0.005 or 0.05mm by 4-dividing.) 0.4mm for the MLS-50. (0.1mm by 4-dividing.) 1mm on the MLS-80.
- Their compactness allows easy installation, operation and versatility.



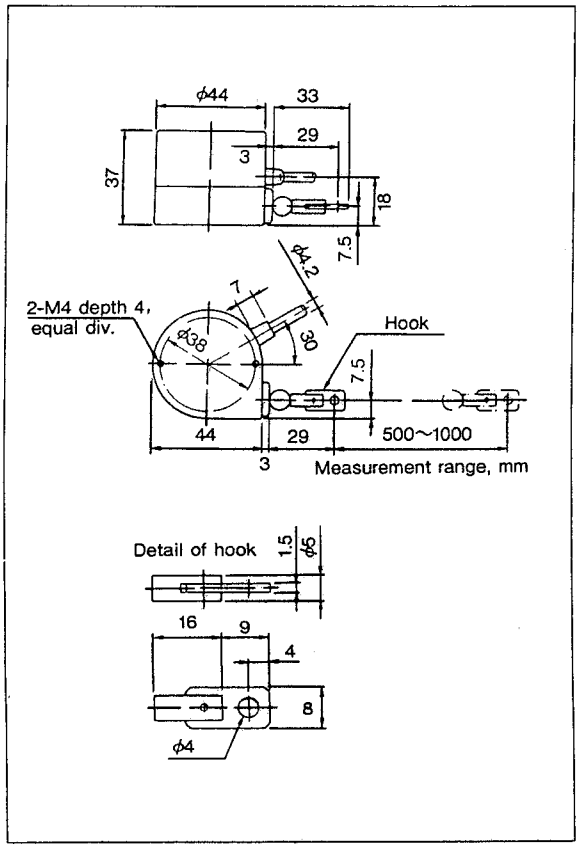
MLS-30 series

Specifications Micro linear scale(encoder+counter)

Type	MLS 30-01-500	MLS 30-01-1000	MLS 30-001-500	MLS 30-001-1000
Wire length(mm)	500	1000	500	1000
Output pulses/1mm	10	10	100	100
Stroke speed mm/sec.	1000	1000	1000	1000
Counting accuracy(pulses)	±1	±1	±1	±1
Absolute accuracy mm	±0.05/100mm			
Minimal reading unit	0.1	0.1	0.01	0.01
Power	AC100V 50/60kHz 180mA max.			
Count-mode	Decimal			
Display	0~±999999.9/0~±99999.99			
Input frequency	500kHz max			
Input signals	Square wave, two-phase(H4.0~5.0V, LO~0.5V)			
Reset	Reset switch provided. ※External reset acceptable.			
Output	※BCD parallel output			
Operating temperature	0~60 °C			
Weight	700g			
Power cord	2m with a plug			

※Optional

Dimensions, mm

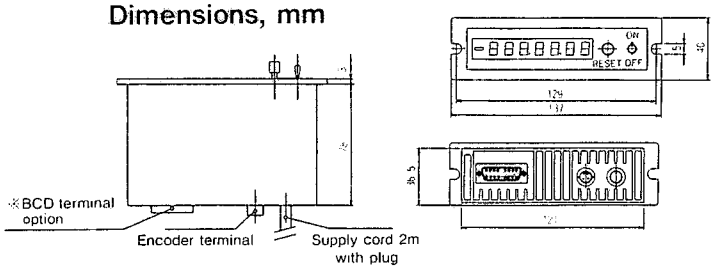


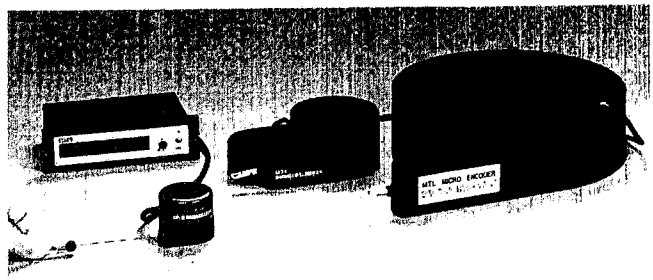
Linear scale encoder

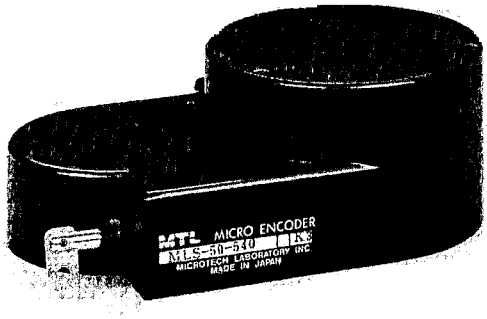
Type	MLS 30-450-500	MLS 30-450-1000	MLS 30-4500-500	MLS 30-4500-1000
Wire length(mm)	500	1000	500	1000
Output pulses/1mm	5(20)	5(20)	50(200)	50(200)
Stroke speed mm/sec.	1000	1000	1000	1000
Absolute accuracy mm	±0.05/100mm			
Resolution (mm)	0.2(0.05)	0.2(0.05)	0.02(0.005)	0.02(0.005)
Supply voltage	DC5~12V±10% DC24V±10% (open collector)		DC5~12V±10%	
Current consumption	60mA max.			
Output phases	A and B phase			
Output form	Square wave, voltage or open collector output			
Output capacity	Sink current: 20mA max. Residual voltage: 0.5V or max.(at 10mA)			
Max. frequency response	50KHz		100KHz	
Output phase	AB phase difference 90°±45°			
Output rise/fall time	2μs or less			
Starting torque	1.4N~2.9N (150~300g)			
Operating temp./Humidity	0°C~50°C/RH35%~90%			
Storage temperature	−20°C~80°C			
Vibration resistance	Endurance 10~55Hz double amplitude/ 2 hours in X, Y and Z directions			
Shock resistance	50G			
Cable	Diameter ϕ4.2mm 4-core shielded vinyl			
Weight	185g			

( ) 4 divided value

■Counter Dimensions, mm







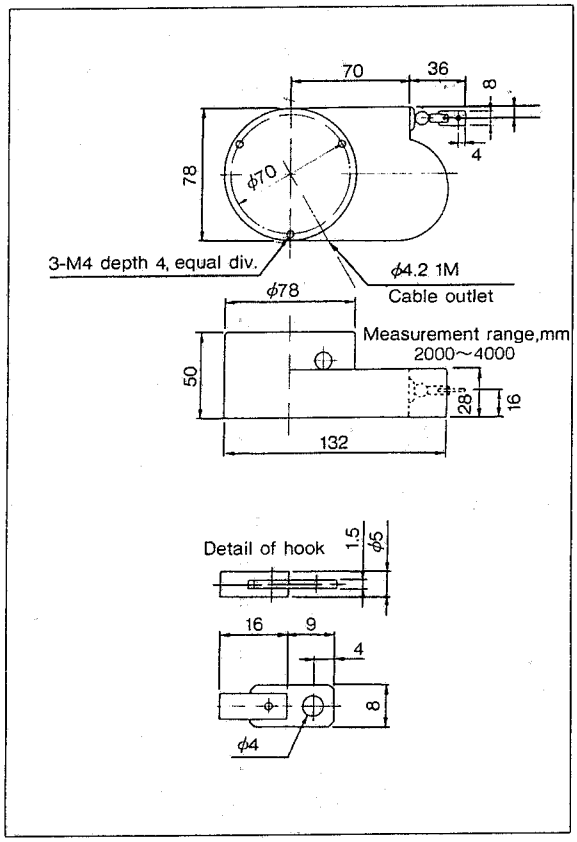
MLS-50 series

■Specifications Micro linear scale(encoder+counter)

Type	MLS 50-01-2000	MLS 50-01-4000
Wire length(mm)	2000	4000
Output pulses/1mm	10	10
Stroke speed mm/sec.	1000	1000
Counting accuracy(pulses)	±1	±1
Absolute accuracy mm	±0.1/1000mm	
Minimal reading unit	0.1	0.1
Power	AC100V 50/60kHz 180mA max	
Count-mode	Decimal	
Display	0～±999999.9	
Input frequency	500kHz max	
Input signals	Square wave, two-phase (H4.0～5.0V, LO～0.5V)	
Reset	Reset switch provided. ※External reset acceptable.	
Output	※BCD parallel output	
Operating temperature	0～60°C	
Weight	1350g	
Power cord	2m with a plug	

※Optional

■Dimensions, mm



■Linear scale encoder

Type	MLS 50-540-2000	MLS 50-540-4000
Wire length(mm)	2000	4000
Output pulses/1mm	2.5(10)	2.5(10)
Stroke speed mm/sec.	1000	1000
Absolute accuracy mm	±0.1/100mm	
Resolution (mm)	0.4(0.1)	0.4(0.1)
Supply voltage	DC5～12V±10%, DC24V±10% (Open collector only)	
Current consumption	60mA max.	
Output phases	A and B phase	
Output form	Square wave, voltage or ※open collector output	
Output capacity	Sink current: 20mA max. Residual voltage: 0.5V or max.(at 10mA)	
Max. frequency response	100kHz	
Output phase	AB phase difference 90°±45°	
Output rise/fall time	2μs or less	
Starting torque	3.9N～6.8N (400～700g)	
Operating temp./Humidity	0°C～50°C/RH35%～90%	
Storage temperature	−20°C～80°C	
Vibration resistance	Endurance 10～55Hz double amplitude/ 2 hours each in X, Y and Z directions	
Shock resistance	50G	
Cable	Diameter φ4.2mm 4-core shielded vinyl	
Weight	850g	

( ) 4 divided value

欢迎索取免费详细资料、设计选型指南和光盘、样品；产品繁多未能尽录，欢迎来电查询。

中国传感器科技信息网：HTTP：//WWW.SENSOR-IC.COM/
工控安防网：HTTP：//WWW.PC-PS.NET/
消费电子专用电路网：HTTP://WWW.SUNSTARE.COM/
E-MAIL： xjr5@163.com szss20@163.com
MSN: suns8888@hotmail.com
QQ: 195847376
地址： 深圳市福田区福华路福庆街鸿图大厦 1602 **室**
电话：0755-83376549 83376489 83387030 83387016
传真：0755-83376182 83338339 **邮编：**518033 **手机：**(0)13902971329
深圳展销部：深圳华强北路赛格电子市场 2583 **号** TEL/FAX：0755-83665529 25059422
北京分公司：北京海淀区知春路 132 **号中发电子大厦** 3097 **号**
TEL：010-81159046 82615020 13501189838 FAX：010-82613476
上海分公司：上海市北京东路 668 **号上海赛格电子市场** 2B35 **号**
TEL：021-28311762 56703037 13701955389 FAX：021-56703037
西安分公司：西安高新开发区 20 **所(中国电子科技集团导航技术研究所)**
西安劳动南路 88 **号电子商城二楼** D23 **号**
TEL：029-81022619 13072977981 FAX:029-88789382
成都：TEL:(0)13717066236
技术支持：0755-83394033 13501568376