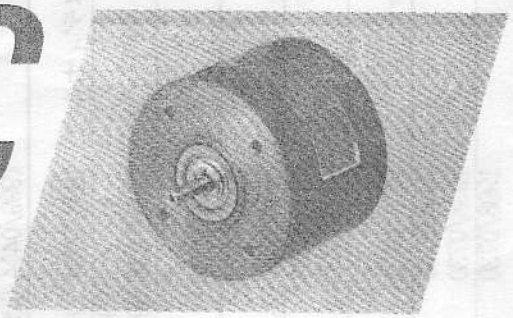
LEC SERIES



GENERAL-PURPOSE WITH VARIETY

- General purpose encoder, with various options.
- A suitable electrical specification can be compiled from the 40 different disc resolutions, various output options, and choice of supply voltage.
- Mounting options and plug connectors ensure easy maintenance inspection.

Explanation of Model

LEC – ○○○○ B M – ○ ○○○

- LEC: Model
- ○○○○: Number of output pulses (1/10 of the following numbers of pulses is suffixed to the model.)
- B: Dual square wave in quadrature; M: Index signal
- ○: Termination
- ○○○: Supply voltage and output

Number of output pulses

20	200	600	2000
25	240	720	2048
30	250	800	2400
40	256	900	2500
50	300	1000	3000
60	320	1024	3125
90	360	1200	3600
100	400	1250	4000
120	500	1500	4096
125	512	1600	5000
150		1800	

Termination

Side entry cable	G
Rear entry cable	E
M.S. plug	C
Hirose plug	H

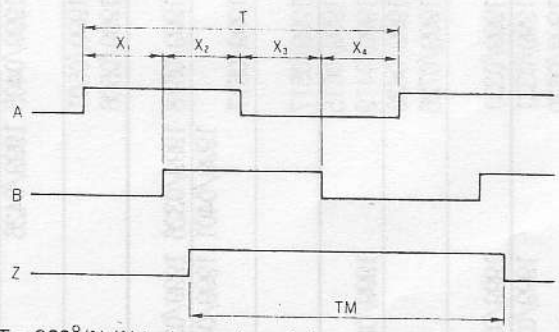
Supply voltage and output

Supply voltage	Output	Model code
5 V	Voltage	05E
	Open collector	05C
	Line driver (75183)	05P
	Line driver (75113)	05D
12 V	Voltage	12E
	Open collector	12C
	Complementary	12F
15 V	Voltage	15E
	Open collector	15C
	Complementary	15F

(An example of model) LEC-1024BM-G05E denotes 1024 P/R, DC 5 V, output voltage, and side entry cable.

■ Output Waveforms and Division Accuracy

● Dual square wave in quadrature with index signal



T = 360°/N (N is the number of A and B channel output pulses per revolution.)
This figure shows the waveforms when a shaft is rotated clockwise (CW) viewing encoder shaft.

● Symmetry
$X_1 + X_2 = 0.5T \pm 0.1T$
$X_2 + X_3 = 0.5T \pm 0.1T$

● Phase shift
$Xn \geqq 0.125T\ (n = 1, 2, 3, 4)$

● Signal width of Z channel $TM = 1T \pm 0.5T$

● Positional relationship of A & B channels and Z channel is not specified.

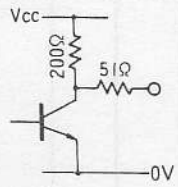
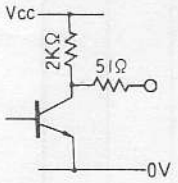
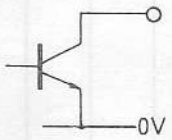
● Division accuracy of signals (A, B channels)

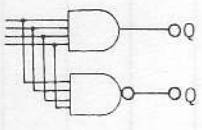
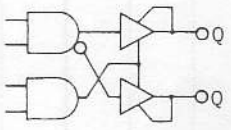
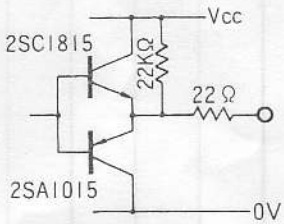
Accumulative angle error	0.2T
Pitch error	0.01T
Adjacent pitch error	0.005T

Electrical Specifications

Model code	Supply voltage [V]	Current requirements [mA]	Output	Output voltage [V]		Sink current [mA]	Max. applied voltage [V]	Min. load resistance [Ω]	Rise/Fall time [μs]	Frequency response [kHz]
				V_H	V_L					
05E	5±0.5	150	Voltage	3.5	0.5	—	—	—	1	100
05C	5±0.5	150	Open collector	—	—	40	40	—	1	100
05P	5±0.25	150	Line driver (75183)	2.5	0.5	—	—	—	1	100
05D	5±0.25	250	Line driver (75113)	2.5	0.5	—	—	—	1	100
12E	12±1.2	150	Voltage	8.0	0.5	—	—	—	1	100
12C	12±1.2	150	Open collector	—	—	40	40	—	1	100
12F	12±1.2	150	Complementary	8.0	1.0	—	—	500	1	100
15E	15±1.5	150	Voltage	10.0	0.5	—	—	—	1	100
15C	15±1.5	150	Open collector	—	—	40	40	—	1	100
15F	15±1.5	150	Complementary	10.0	1.0	—	—	500	1	100

Output Circuit

Model code	05E	12E	15E	05C	12C	15C
Output	Voltage			Open collector		
	5V	12V, 15V				
Circuit						

Model code	05P	05D	12F	15F
Output	Line driver		Complementary	
Circuit				
	$Q = A, B, Z$ $\overline{Q} = \overline{A}, \overline{B}, \overline{Z}$			

Mechanical Specifications

Slew speed	Starting torque (at 25°C)	Max. allowable load		Moment of inertia	Allowable input angle acceleration	Bearing life (5000 rpm)
		Radial direction	Axial direction			
5000 r/min	3×10^{-3} N·m	19.6 N	9.8 N	3.6×10^{-6} kg·m²	10^4 rad/s²	50000 h

Environmental Specifications

Function No.	Operating temperature	Storage temperature	Vibration resistance	Shock resistance	Construction	Weight
05E, 05C 12E, 12C, 12F 15E, 15C, 15F	−10°C ~ +60°C	−30°C ~ +70°C	49 m/s² (10 – 200 Hz, 2 hrs each in X, Y, Z directions)	980 m/s² (2 times each in X, Y, Z directions)	Equivalent to IP40	0.42 kg
05P, 05D	0°C ~ +60°C	−30°C ~ +70°C	49 m/s² (10 – 200 Hz, 2 hrs each in X, Y, Z directions)	980 m/s² (2 times each in X, Y, Z directions)	Equivalent to IP40	0.42 kg

Specifications of Connection

Side entry and Rear entry cable

Voltage Open collector	Color of cable	White	Black	Red	Green	Yellow			
	Name plate symbol	□V	0V	A	B	Z			
	Signal	DC+□V	0V common	A ch.	B ch.	Z ch.			

Cabtyre cable in use: Our specifications, SP-1139 (Sectional area of core wire: 0.3 mm², outside diameter: ϕ6 mm, package shield)

Line driver	Color of cable	White	Black	Red	Red/ Black	Green	Green/ Black	Yellow	Yellow/ Black
	Name plate symbol	5V	0V	A	Anot	B	Bnot	Z	Znot
	Signal	DC+5V	0V	A ch.	$\overline{A}$ ch.	B ch.	$\overline{B}$ ch.	Z ch.	$\overline{Z}$ ch.

Cabtyre cable in use: Our specifications, SP-0962 (Sectional area of core wire: 0.2 mm², outside diameter: ϕ6 mm, 4-twisted pairs, package shield)

Complementary	Color of cable	White	Black	Red	Red/ Black	Green	Green/ Black	Yellow	Yellow/ Black
	Name plate symbol	□V	0V	A	0V	B	0V	Z	0V
	Signal	DC+□V	0V common	A ch.	0V common	B ch.	0V common	Z ch.	0V common

Cabtyre cable in use: Our specifications, SP-0962 (Sectional area of core wire: 0.2 mm², outside diameter: ϕ6 mm, 4-twisted pairs, package shield)

MS plug

Voltage Open collector	Pin code	A	B	C	D	E	F	G	H	J	K
	Name plate symbol	A	Z	B	—	—	—	—	□V	—	0V
	Signal	A ch.	Z ch.	B ch.	—	—	—	—	DC+□V	—	0V common
	Pin code	L	M	N	P	R	S	T			
	Name plate symbol	—	0V	—	—	—	—	Body			
	Signal	—	0V common	—	—	—	—	Body			

Receptacle in use: MS3102A-20-29P, Mating plug·cable clamp: MS3106B-20-29S, MS3057-12A (not attached)

Line driver	Pin code	A	B	C	D	E	F	G	H	J	K
	Name plate symbol	A	Z	B	—	—	—	—	5V	—	0V
	Signal	A ch.	Z ch.	B ch.	—	—	—	—	DC+5V	—	0V
	Pin code	L	M	N	P	R	S	T			
	Name plate symbol	—	0V	Anot	Znot	Bnot	—	Body			
	Signal	—	0V	$\overline{A}$ ch.	$\overline{B}$ ch.	$\overline{Z}$ ch.	—	Body			

Receptacle in use: MS3102A-20-29P, Mating plug·cable clamp: MS3106B-20-29S, MS3057-12A (not attached)

Complementary	Pin code	A	B	C	D	E	F	G	H	J	K
	Name plate symbol	A	Z	B	—	—	—	—	□V	—	0V
	Signal	A ch.	Z ch.	B ch.	—	—	—	—	DC+□V	—	0V common
	Pin code	L	M	N	P	R	S	T			
	Name plate symbol	—	0V	0V	0V	0V	—	Body			
	Signal	—	0V common	0V common	0V common	0V common	—	Body			

Receptacle in use: MS3102A-20-29P, Mating plug·cable clamp: MS3106B-20-29S, MS3057-12A (not attached)

Hirose plug

Voltage Open collector Complementary	Pin No.	1	2	3	4	5	6	7	8	9	10
	Name plate symbol	□V	0V	A	0V	B	0V	Z	0V	—	Body
	Signal	DC+□V	0V common	A ch.	0V common	B ch.	0V common	Z ch.	0V common	—	Body

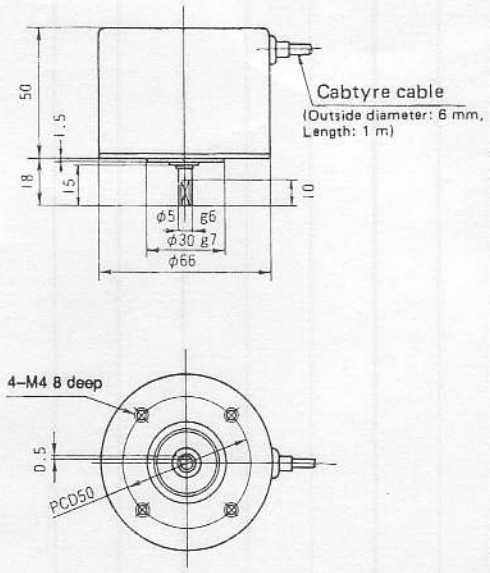
Receptacle in use: RM15WTR-10P, Mating plug: RM15TP-10S

Line driver	Pin No.	1	2	3	4	5	6	7	8	9	10
	Name plate symbol	5V	0V	A	Anot	B	Bnot	Z	Znot	—	Body
	Signal	DC+5V	0V	A ch.	$\overline{A}$ ch.	B ch.	$\overline{B}$ ch.	Z ch.	$\overline{Z}$ ch.	—	Body

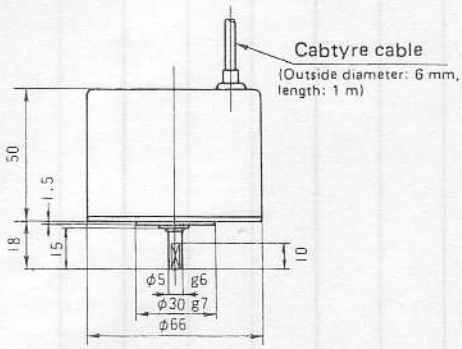
Receptacle in use: RM15WTR-10P, Mating plug: RM15TP-10S

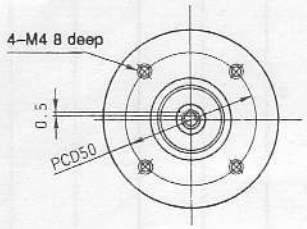
External View

Termination G Side entry cable

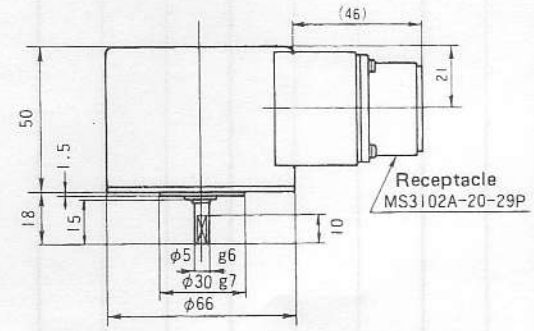


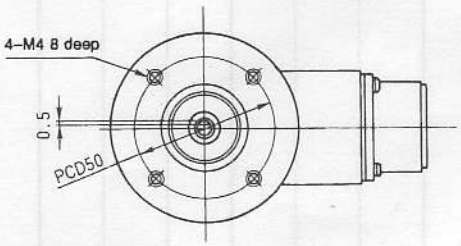
Termination E Rear entry cable



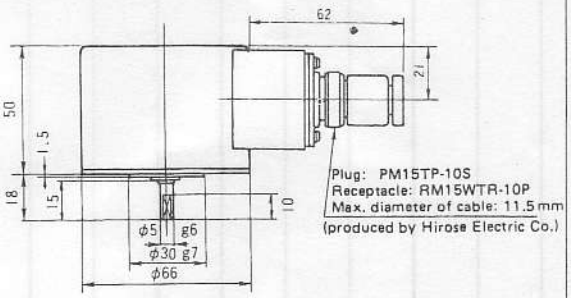


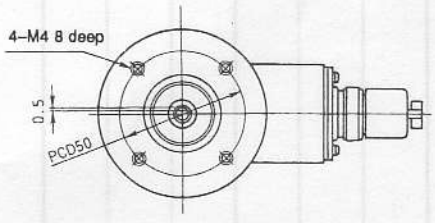
Termination C MS plug



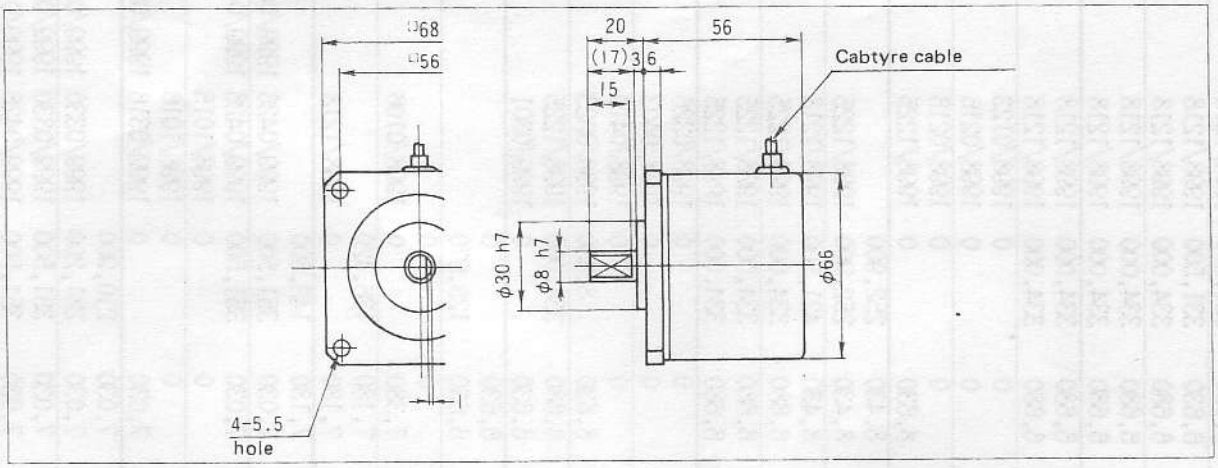


Termination H Hirose plug

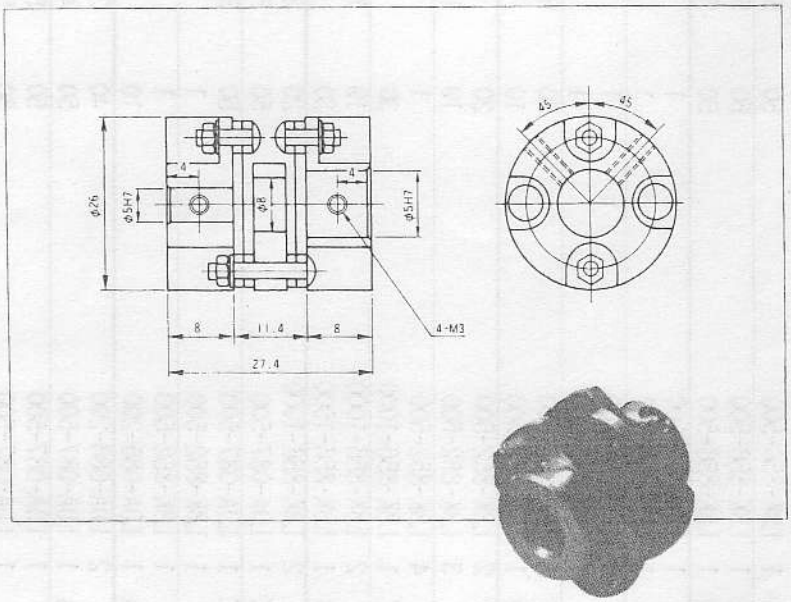




External View of Special Products



Recommended Coupling



Model: C-22-5S/5S

Max. rpm		20000 r/min
Allowable torque		0.98 N·m
Allowable mounting misalign-ment	Angular offset	1.5° ※
	Parallel offset	0.2mm ※
Torsional rigidity		264 N·m/rad
Temperature range		−30°C ~ +100°C
Weight		0.028 kg
Moment of inertia (GD^2)		2.5 x 10^{-6} kg·m^2
Diameter of shaft hole	No key	5~10mm ※
	Set screw	M3

※ Specifications of a single coupling unit. Contact us about the allowable value when used with LEC.

■ Please refer to page 106 "User Instructions."