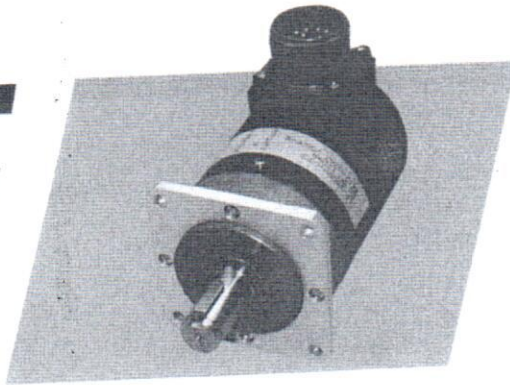


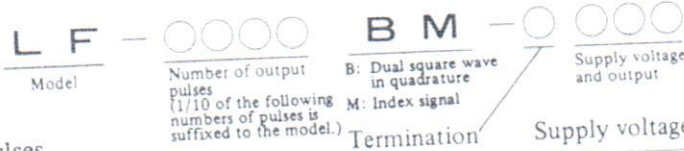
LF SERIES



HEAVY DUTY ENCODER

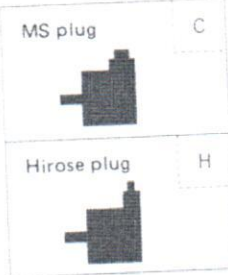
- The 15 mm diameter shaft, accepting 49 N radial and axial loading, is capable of 6000 rpm, and has an oil seal. The rugged construction ensures suitability for use in a hostile environment.
- High speed response – 100 kHz at 5000 pulses/rev. maximum.
- A plug connector allows easy electrical connection and simplicity of maintenance.
- A very suitable encoder for use on machine shafts, and in heavy industry such as iron and paper mills.

Explanation of Model



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	



Supply voltage and output

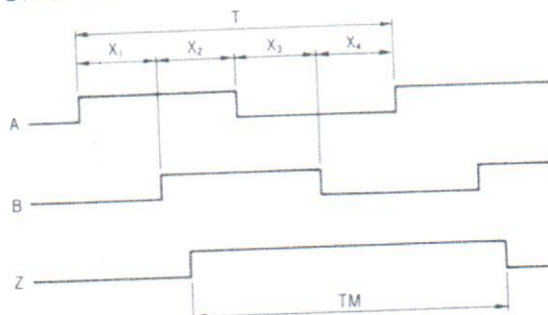
Supply voltage	Output	Model code
5 V	Voltage	05E
	Open collector	05C
	Line driver (75183)	05P
	Line driver (75113)	05D
12 V	Voltage	12E
	Open collector	12C
	Complementary	12F
15 V	Voltage	15E
	Open collector	15C
	Complementary	15F

(An example of model) LF-1024BM-C05E denotes DC 5 V, output voltage, MS plug and 1024 P/R.

※ We have three types of flange – □68, □80, and □160.

Output Waveforms and Division Accuracy

- Dual square wave in quadrature with index signal



$T = 360^\circ/N$ (N is the number of A & 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

$$X_n \geq 0.125T (n=1, 2, 3, 4)$$

- 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 [μ s]	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		
Circuit						
Model code	05P	05D	12F	15F		
Output	Line driver		Complementary			
Circuit						
	Q = A, B, Z $\bar{Q} = \bar{A}, \bar{B}, \bar{Z}$					

■ Mechanical Specifications

Slew speed	Starting torque (at 25°C)	Max. allowable load		Moment of inertia	Allowable input angle acceleration	Bearing life (6000 rpm)
		Radial direction	Axial direction			
6000 r/min	5 × 10 ⁻² N·m	49 N	49 N	1.3 × 10 ⁻⁸ kg·m ²	10 ⁴ rad/s ²	10000 h

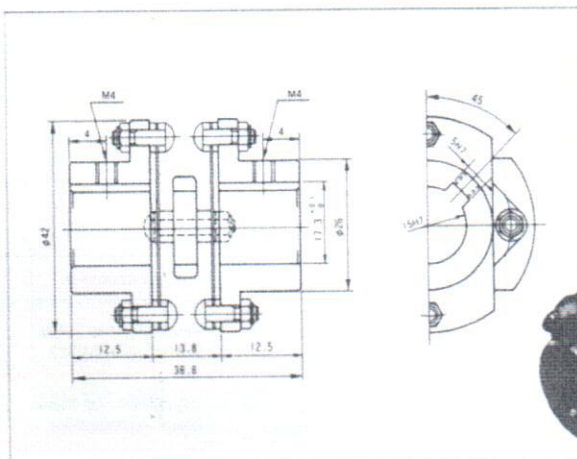
■ Environmental Specifications

Model code	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/s ² (10 - 200 Hz, 2 hrs each in X, Y, Z directions)	980 m/s ² (2 times each in X, Y, Z directions)	Equivalent to IP54 (excl. receptacle)	0.65kg
05P, 05D	0°C ~ +60°C	-30°C ~ +70°C	49 m/s ² (10 - 200 Hz, 2 hrs each in X, Y, Z directions)	980 m/s ² (2 times each in X, Y, Z directions)	Equivalent to IP54 (excl. receptacle)	0.65kg

■ Specifications of Connection

Voltage Open collector	Pin code	A	B	C	D	E	F	G	H	J	K	
	Name plate symbol	A	Z	B	—	—	—	—	$\square V$	—	0V	
	Signal	A ch.	Z ch.	B ch.	—	—	—	—	DC + $\square V$	—	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	\bar{A} ch.	\bar{Z} ch.	\bar{B} 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	—	—	—	—	$\square V$	—	0V	
	Signal	A ch.	Z ch.	B ch.	—	—	—	—	DC + $\square V$	—	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)												
Voltage Open collector Complementary	Pin No.	1	2	3	4	5	6	7	8	9	10	
	Name plate symbol	$\square V$	0V	A	0V	B	0V	Z	0V	—	Body	
	Signal	DC + $\square V$	0V common	A ch.	0V common	B ch.	0V common	Z ch.	0V common	—	Body	
	Receptacle in use: RM15WTR-10P, Mating plug: RM15TP-10S (attached)											
	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.	\bar{A} ch.	B ch.	\bar{B} ch.	Z ch.	\bar{Z} ch.	—	Body	
Receptacle in use: RM15WTR-10P, Mating plug: RM15TP-10S (attached)												

■ Recommended Coupling

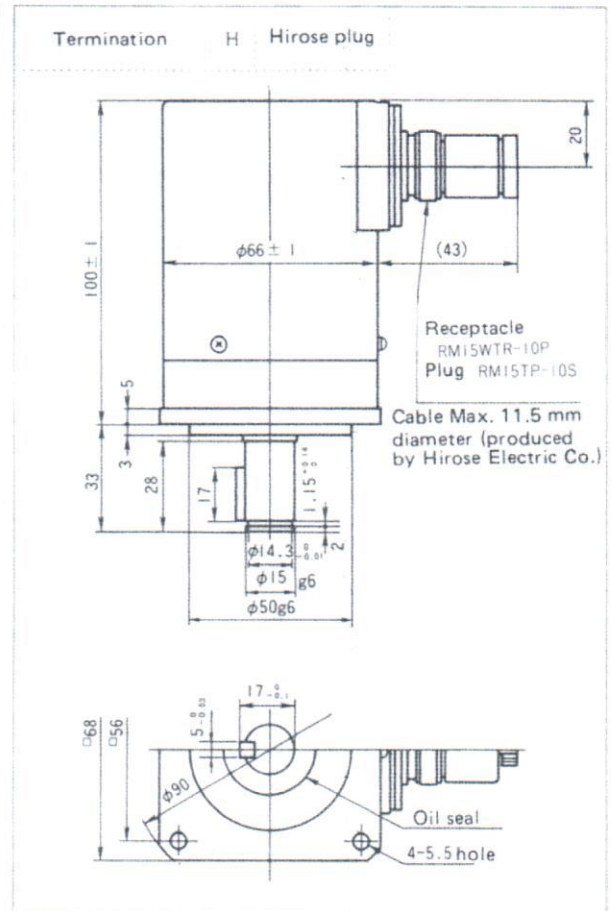
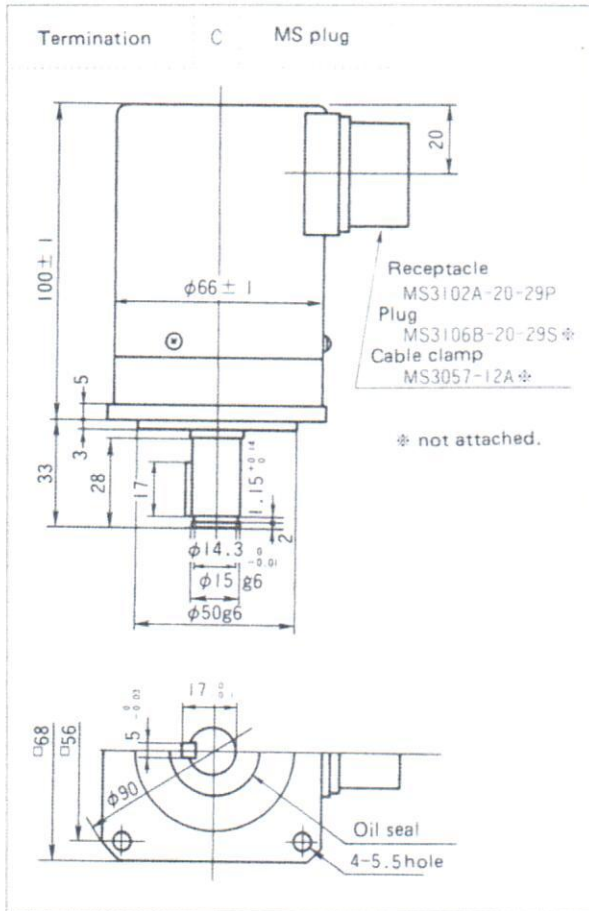


Model: C-19-15K/15K

Max. rpm	20000 r/min	
Allowable torque	3.92 N·m	
Allowable mounting misalignment	Angular offset	1.5° ϕ
	Parallel offset	0.3mm ϕ
Torsional rigidity	1685 N·m/rad	
Temperature range	-30°C ~ +100°C	
Weight	0.065 kg	
Moment of inertia (GD ²)	1.5 × 10 ⁻⁵ kg·m ²	

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

External View



■ Please refer to page 106 "User Instructions."