

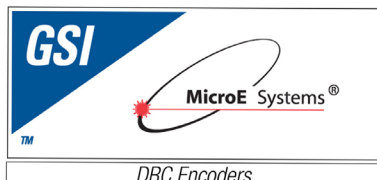
# MODEL M35

## Incremental Optical Rotary Encoder



- Our highest resolution rotary encoder
- Stainless steel housing for thermal stability
- Up to 360,000 counts per shaft revolution ( .001° or 3.6 arc seconds )
- Dual read optics for disc eccentricity error cancellation
- Internal cycle interpolation electronic factors of 2X, 5X, or 10X

The Model M35 is a 3.5" diameter incremental optical encoder designed for high-resolution applications where thermal stability is a prime consideration. The Model M35's stainless steel housing and dual read optical structure combine to offset the effects of thermal expansion of bearing structure components while negating disk eccentricity error. Available in resolutions to 360,000 counts per shaft revolution, the Model M35 is well suited to applications in the fields of microlithography, photogrammetry, antenna pedestal positioning, high resolution machine tools and rotary table systems. Designed for easy mechanical and electrical interfacing. The Model M35 can be provided with TTL square wave, Open Collector with or without internal pull-ups and for high ambient noise and or long transmission length applications Differential Line Driver.



# M35 SPECIFICATIONS

## ELECTRICAL

Resolution range:	Up to 9,000 cycles per shaft revolution, ( 360,000 counts with internal interpolation and external quadrature ).
Light source:	Gallium aluminum arsenide L.E.D. rated @ 100,000 Hrs. MTBF (mfg's spec).
Light sensor:	Photodiode.
Excitation voltage:	+5Vdc, +12Vdc, and +15Vdc $\pm$ 5%.
Output format:	Two count channels ( A & B ) in phase quadrature with an optional ZR output.
Quadrature:	90° $\pm$ 22° ( at 10 KHz output frequency ).
Symmetry:	180° $\pm$ 18° ( at 10 KHz output frequency ).
Rise and fall time:	1 microsecond max. into 1,000pf load capacitance.
Frequency response:	150 KHz max. into a 1x line driver. 2x, 5x, 10x interpolation at 100 KHz max. input.
Zero reference width:	1 $\pm$ 1/2 cycle, 1/4 cycle or 1/2 cycle gated, depending on electronic configuration.
ZR alignment:	Full cycle: approximately centered on the rising edge of channel A. 1/2 cycle aligns with negative transition of channel B. 1/4 cycle aligns with both A & B high.
Phase sense:	Channel A leads Channel B for counterclockwise rotation of the shaft, as viewed from the cover side of the unit.
Output:	See part number table for available output options.
Read station type:	2 read stations 180 degrees apart for eccentricity error cancellation.
Error:	Instrument error $\pm$ 5 arc seconds maximum.

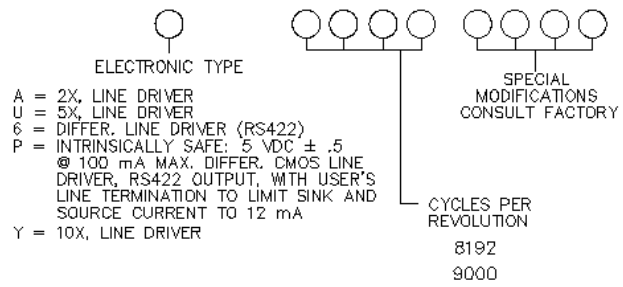
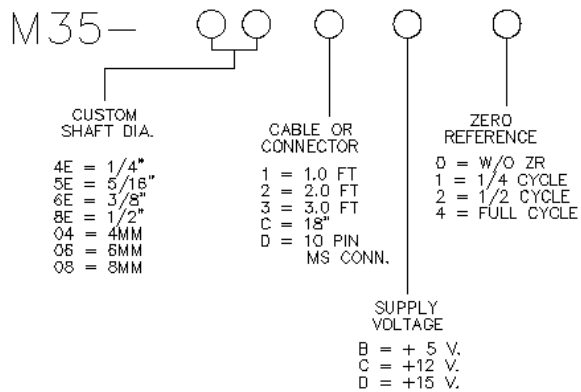
## MECHANICAL

Shaft loading:	10 Lbs. Radial; 25 Lbs. Axial ( L10 life of 1 x 10 to 9 <sup>th</sup> revs).
Shaft run-out:	.0005 T.I.R.
Starting torque:	5.0 oz. Inches max. at 25°C.
Shaft angular acceleration:	100,000 radian / sec. squared (maximum).
Moment of inertia:	0.004 oz. In. sec. squared.
Bearing type:	Stainless steel radial shielded.
Max. operating speed:	3000 RPM or max. operating frequency response of 150 KHz, whichever occurs first.
Slew speed:	3,000 RPM ( maximum).
Connector type:	MS3102R18-1P ( 10 conductor).
Cable description:	Individually shielded twisted pairs plus an overall shield. Cable contains 11 conductors. Unused leads are cut at end of cable.
Housing material:	Stainless steel.
Shaft material:	Stainless steel.

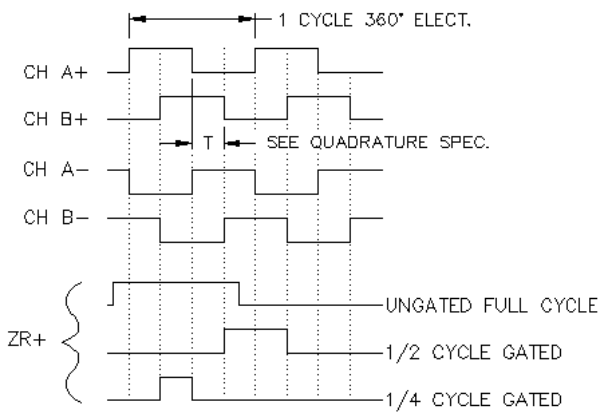
## ENVIRONMENTAL

Operating temperature:	-40°C to +85°C
Storage temperature range:	-50°C TO +90°C
Shock:	50 G for 11 millisecond duration.
Vibration:	20 Hz to 2000 Hz @ 5 G.
Humidity:	To 98% R.H. ( non-condensing).

CABLE WIRE COLOR	10 PIN	FUNCTION
ORANGE	A	CHANNEL +A
GREEN	B	CHANNEL -A
YELLOW	C	CHANNEL +B
BLUE	D	CHANNEL -B
BROWN	E	CHANNEL +ZR
GRAY	F	CHANNEL -ZR
BLACK	J	COMMON
RED	I	+VDC
VIOLET	H	CASE GROUND



Note: With P type electronics, terminating line resistors must be greater than 430 ohms to qualify for intrinsically safe operation.



ZR- IS AVAILABLE, CONSULT FACTORY.

CIRCUITRY TYPES	AVAILABLE ZR OPTIONS
TYPE A, U, Y	0, 1
TYPE 6, P	0, 1, 2, 4

