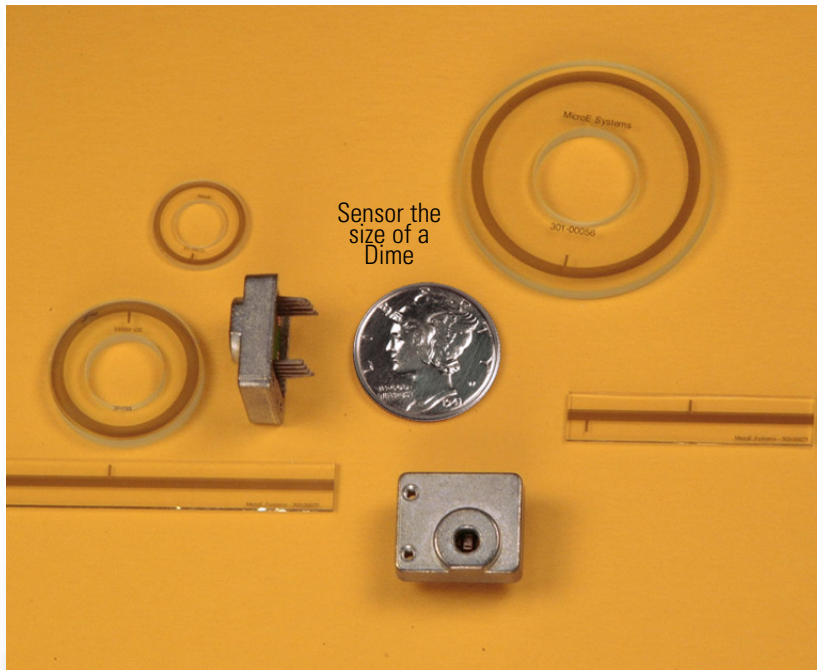


# Mercury™ 1200 PCB-Mount Analog Encoders

## For Customer Interpolation- Resolution to 0.078µm

Reflective Linear and Rotary Encoders



### Resolution

Determined by Customer Electronics

Linear: 20µm to 0.078µm  
Rotary: 2,500 to 4.2M CPR

### Accuracy

Linear: ± 1µm available  
± 3µm to ± 5µm standard  
Rotary: Up to ± 2.1 arc-sec

### Output

Analog Sine/Cosine and Index Window

The Mercury 1200 encoder is an analog output system. Designed for PC board mounting, it is available with linear or rotary scales. Mercury's space-saving, integrated configuration gives OEM system designers a breakthrough in performance.

### Imagine what you can do with this!

OEMs can now use encoders for closed loop control where it was previously not possible or cost effective. Using your interpolation electronics, engineers can achieve dramatic improvements in system speed, throughput, and reliability, while reducing cost, size and weight. The Mercury 1200 series kit encoders make it all possible. The analog output sensors can mount directly on your printed circuit board within an EMI shielded module. The low Z height of the sensor, only 5.6mm, opens up exciting design possibilities.

OEMs that want to incorporate our interpolation electronics can contact MicroE for chip set or daughterboard solutions.

### Standard Features

- Small PCB mount sensor
- Sensor is 5.6mm (H) x 11.9mm (W) x 14.9mm (L) and weighs 1.2g
- Fundamental resolution: Linear 20µm; Rotary 2,500 - 16,384 CPR  
Interpolated linear resolution up to 0.078µm;  
Rotary resolution 2,500 CPR to 4.2M CPR
- Analog output: sine/cosine and Index window
- Bi-directional Index window signal
- Index mark at the center or end of the glass scale (linear)

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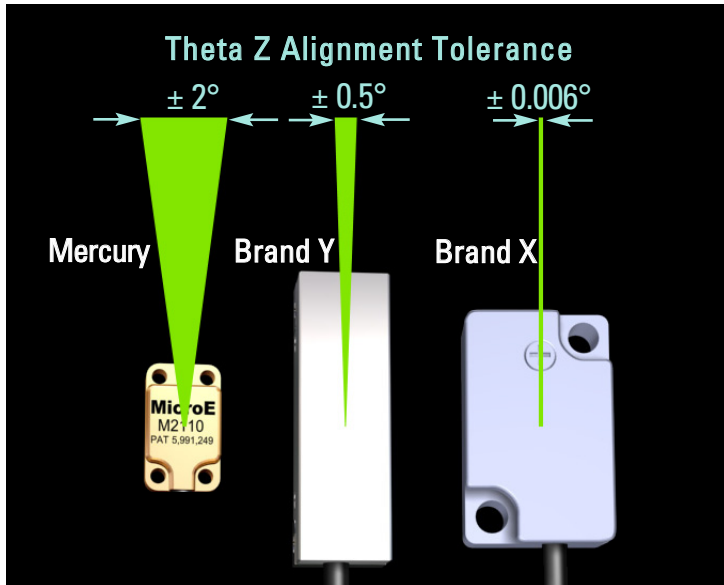
#### Optional features

- Glass scale length or diameter:  
Linear lengths from 5mm to 2m  
Rotary diameters from 12mm to 108mm



# Broader Alignment Tolerances, Increased Standoff Clearance, Smallest Sensor and More

Why Mercury Encoders Make It Easier To Design High Performance Into Your Equipment



## Eliminate the Frustration of Touchy Encoder Alignment

### Mercury Solves this Problem for Good

Fussy alignment is no longer a concern. With Mercury's patented PurePrecision™ optics, advanced SmartPrecision™ electronics and LED alignment indicators, you can push the sensor against your reference surface, tighten the screws and you're finished. Try that with brand X or Y.

This performance is possible thanks to relaxed alignment tolerances, particularly in the theta Z axis. Mercury offers a  $\pm 2^\circ$  sweet spot— that's a 300% improvement over the best competitive encoder. And that will result in dramatic savings in manufacturing costs.

No other commercially available encoder is easier to align, easier to use, or easier to integrate into your designs.

## Alignment Tolerance Comparison\*\*

	Mercury*	Brand X	Brand Y	Mercury vs. Best Competitor
Z Standoff	$\pm 0.15\text{mm}$	$\pm 0.1\text{mm}$	$\pm 0.1\text{mm}$	Mercury is 50% better
Y	$\pm 0.20\text{mm}$ for linear $\pm 0.10\text{mm}$ for rotary $\geq 19\text{mm}$ dia.	$\pm 0.1\text{mm}$	unspecified	Mercury is 100% better
theta X	$\pm 1.0^\circ$	unspecified	$\pm 1.0^\circ$	
theta Y	$\pm 2.0^\circ$	$\pm 0.1^\circ$	$\pm 1.0^\circ$	Mercury is 100% better
theta Z	$\pm 2.0^\circ$	$\pm 0.006^\circ$	$\pm 0.5^\circ$	Mercury is 300% better

\*Measured at a constant temperature for one axis at a time with all other axes at their ideal positions.

\*\*Based on published specifications

## Mercury Can Reduce System Size and Cost

Mercury's sensor height is 44% shorter than competitive encoders, making it easy to fit into your design. This reduction can also cut total system weight and cost by allowing the use of smaller motors and stages. Safe system operation is also enhanced thanks to Mercury's generous standoff clearance— 200% greater than other encoders. And its standoff tolerance is 50% greater than the best alternative.

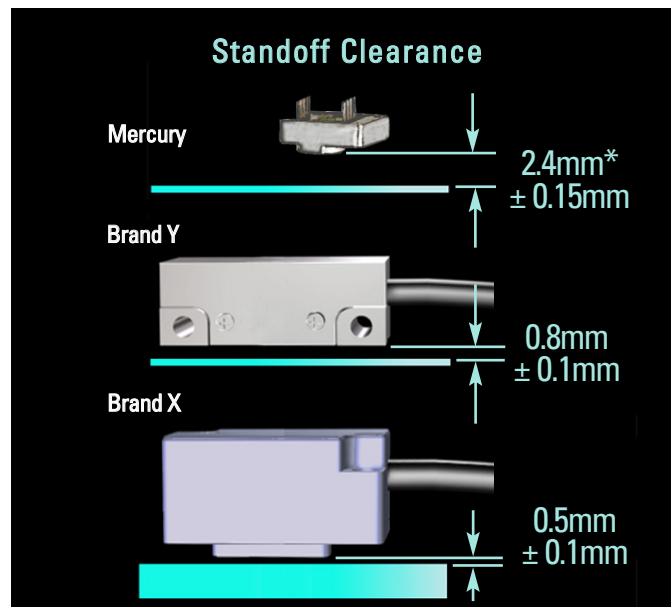
This significantly relaxes mechanical system tolerances, while reducing system costs.

## Mechanical Dimension Comparison\*\*

	Mercury	Brand X	Brand Y	Mercury vs. Best Competitor
Sensor Z height	8.4mm	23mm	15mm	44% better
Standoff clearance	2.4mm	0.5mm	0.8mm	200% better
Standoff tolerance	$\pm 0.15\text{mm}$	$\pm 0.1\text{mm}$	$\pm 0.1\text{mm}$	50% better
System height	11.7mm	28.5mm	15.8mm	26% better

\*\*Based on published specifications

Note: Mercury 1200 is even smaller at 5.6mm sensor height



\* Dimensions shown illustrate encoder system standoff clearance; see Mercury Encoder Interface Drawings for correct design reference surfaces.

# System Specifications

## System

Grating Period	20µm		
Signal Period	20µm		
System Resolution	Fundamental resolution: Linear 20µm; Rotary 2,500 - 16,384 CPR Interpolated resolution determined by customer electronics: Linear: 20µm - 0.078µm; rotary: 2,500 to 4.2M CPR		
Linear Accuracy*	Better than ±1µm available; contact MicroE Better than ±3µm up to 130mm, ±5µm from 155mm to 1m, ±5µm per meter from 1m to 2m		
*Maximum peak to peak error over the specified movement when compared to a NIST-traceable laser interferometer standard, used at room temperature and with MicroE interpolation electronics.			
Rotary Accuracy*	Scale O.D.	Microradians	Arc-Seconds
	12.00mm	±100	±21
	19.05mm	±63	±13
	31.75mm	±38	±7.8
	57.15mm	±19	±3.9
	107.95mm	±10	±2.1

\*Based on ideal scale mounting concentricity

## Sensor Size

W:	12.70mm	0.500"
L:	15.24mm	0.600"
H:	5.59mm	0.220"

## Operating and Electrical Specifications

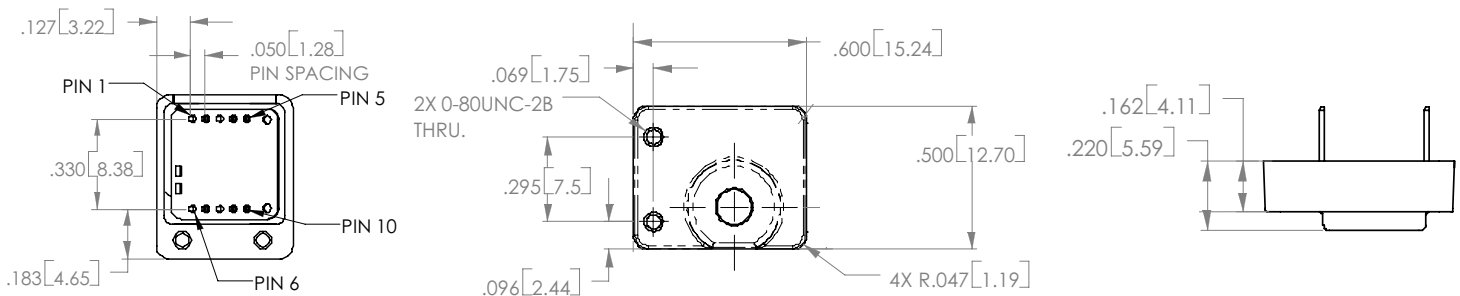
Power Supply	5VDC ±5% @ 33mA
Temperature	
Operating:	0 to 70°C
Storage:	-20 to 70°C
Humidity:	10 - 90% RH non-condensing
Shock:	1500G 0.5ms half sine
Sensor Weight:	2.6g ( Sensor without cable )

## Maximum Speed

	Scale Length/Diameter	Maximum Speed*
Linear	All Lengths	7200mm/s
Rotary	0.75"	8640 RPM
	1.25"	5273 RPM
	2.25"	2637 RPM
	4.25"	1318 RPM

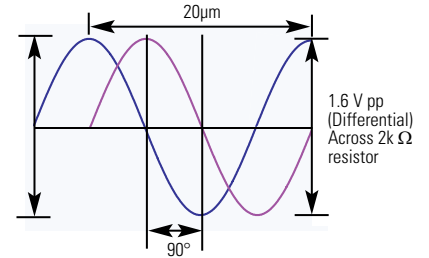
\*Assumes customer electronics have adequate bandwidth

## Mechanical Information - Sensor



All Specifications are subject to change. All data is accurate to the best of our knowledge. MicroE Systems is not responsible for errors.

## Analog Output Pins 1,2,3 and 4

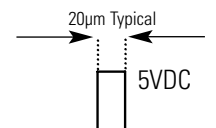


## Mercury 1200 Outputs

### 10-pin interface

PIN	FUNCTION
1	Sine +
2	Sine -
3	Cosine +
4	Cosine -
5	+ 5 V DC
6	Reserved - Do Not Connect
7	Reserved - Do Not Connect
8	Index Window -
9	Index Window +
10	Ground

## Index Window Pin 9



# Scale Specifications

## Standard and Customized Scales

MicroE Systems offers a wide array of chrome on glass scales for the highest accuracy and best thermal stability. Easy to install, standard linear and rotary scales meet most application requirements. Customized linear, rotary, and rotary segment scales are available where needed. All scales include an optical index. Mercury's glass scales save time by eliminating motion system calibrations or linearity corrections required by other encoders, and provide better thermal stability than metal tape scales.

### Options include:

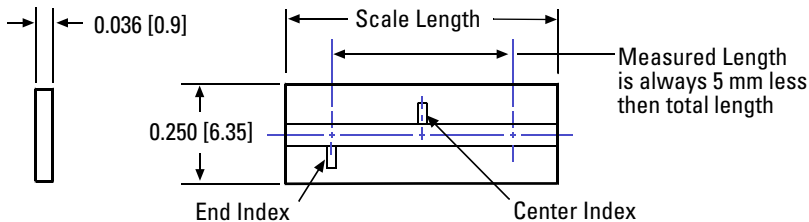
- *Standard linear*: 18mm - 2m
- *Standard rotary*: 12mm - 107.95mm diameter, with or without hubs
- *Custom linear\**: special lengths, widths, thickness, index mark locations and special low CTE materials
- *Custom rotary\**: special ID's, OD's (up to 304.8mm), index mark outside the main track and special low CTE materials
- *Mounting of hubs for rotary scales*: MicroE Systems can mount and align standard, custom, or customer-supplied hubs
- *Rotary segments\**: any angle range; wide range of radius values

\*Custom scales or rotary segments are available in OEM quantities. Contact your local MicroE Systems sales office.

## Standard Short Linear Scales

### 130mm and Shorter

Key: inches[mm]



### Specifications

Accuracy	±3µm standard ±1µm available
Material	Soda lime glass
Typical CTE	8ppm/°C
Index	Center or End

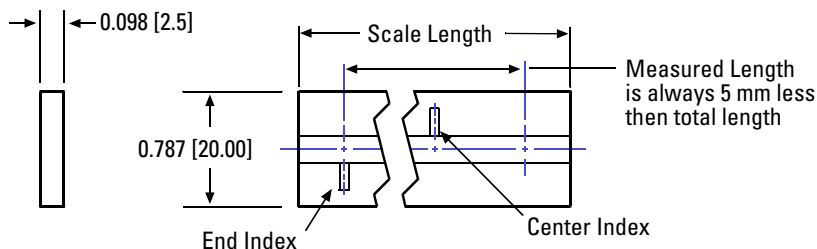
Model	L18	L30	L55	L80	L105	L130
Scale Length	0.709 [18]	1.181 [30]	2.165 [55]	3.150 [80]	4.134 [105]	5.118 [130]
Measured Length	0.512 [13]	0.984 [25]	1.969 [50]	2.953 [75]	3.937 [100]	4.921 [125]

Custom scales available

## Standard Long Linear Scales

### 155mm and Longer

Key: inches[mm]



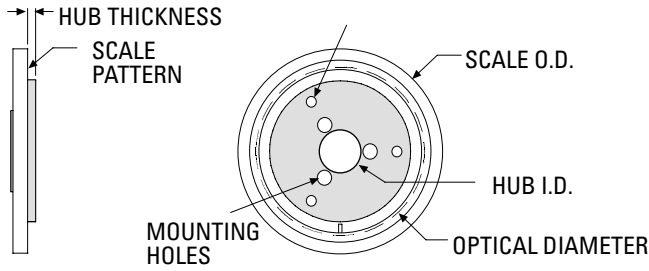
### Specifications

Accuracy	±5 µm <1m ±5 µm/m >1m
Material	Soda lime glass
Typical CTE	8ppm/°C
Index	Center or End

Model	L155	L225	L325	L425	L525	L1025	L2025
Scale length	6.102 [155]	8.858 [225]	12.795 [325]	16.732 [425]	20.669 [525]	40.354 [1025]	79.724 [2025]
Measured length	5.906 [150]	8.661 [220]	12.598 [320]	16.535 [420]	20.472 [520]	40.157 [1020]	79.528 [2020]

Custom scales available

# Standard Rotary Scales



### Specifications

Material	Soda lime glass
Typical CTE	8ppm/°C

Key: inches[mm]

Model No.	Scale Outer Diameter	Scale Inner Diameter	Optical Diameter	Hub Inner Diameter +.0005/-0.0000	Hub Thickness	Fundamental CPR
R1206	0.472 [12.00]	0.250 [6.35]	0.413 [10.50]	0.1253 [3.18]	0.040 [1.02]	1650
R1910	0.750 [19.05]	0.375 [9.52]	0.627 [15.92]	0.1253 [3.183]	0.040 [1.02]	2500
R3213	1.250 [31.75]	0.500 [12.70]	1.027 [26.08]	0.2503 [6.358]	0.050 [1.27]	4096
R5725	2.250 [57.15]	1.000 [25.40]	2.053 [52.15]	0.5003 [12.708]	0.060 [1.52]	8192
R10851	4.250 [107.95]	2.000 [50.80]	4.106 [104.30]	1.0003 [25.408]	0.080 [2.03]	16384

Custom scales available

# How to Order Mercury 1200 Encoder Systems

To specify your Mercury encoder with the desired scale, consult the chart below to create the correct part number for your order. Call MicroE Systems' Rapid Customer Response team for more information [508] 903-5000.

Example (linear): M1200-L55-C1 (Rotary): M1200-R3213-HB

<u>M1200</u>	–	<u>Scale Model</u>	–	<u>Scale Mounting</u>
M1200		Lxxx or Rxxxx		For Linear Scales: T = Tape Mounting C1 = 3 scale clamps* C2 = 10 scale clamps**
				Hubs for Rotary Scales: NH = No hub HE = for R1206 HA = for R1910 HB = for R3213 HC = for R5725 HD = for R10851

\* 3 clamps come standard with linear scales up to 130mm

\*\* 10 clamps come standard with linear scales 155mm or longer

All Specifications are subject to change. All data is accurate to the best of our knowledge. MicroE Systems is not responsible for errors.

