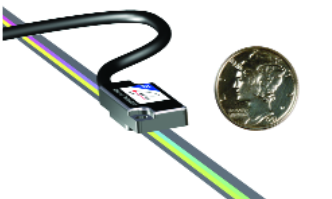
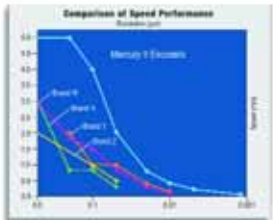


Mercury II™

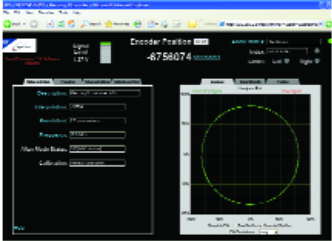
The Next Generation of High-Performance Encoders



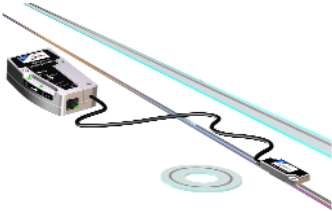
Smaller



Faster



Smarter



More Versatile



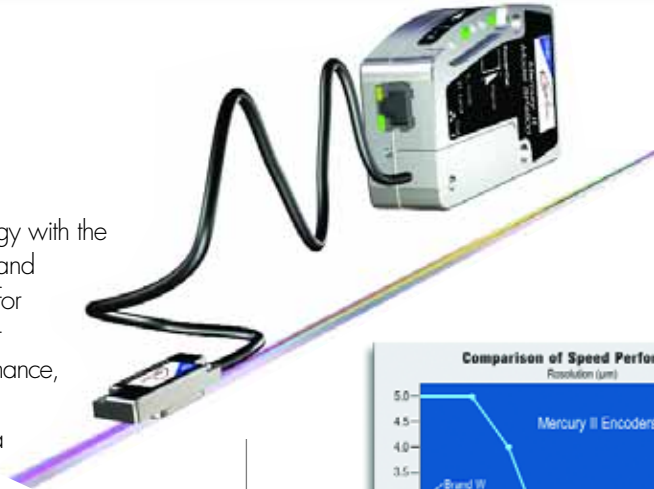
Easier

Introducing Mercury II™: The Next Generation

A Breakthrough in High-Performance Encoder Technology

Now with PurePrecision™ Laser Tape and Glass Scales

MicroE Systems revolutionized encoder technology with the original Mercury encoder family. Smaller, faster, and smarter than anything before, it set the standard for innovation. Now, Mercury II takes another giant step forward by giving you “best-in-class” performance, unparalleled versatility, superior robustness, and unmatched ease of use. You get all of this from a single system, without making trade-offs.



Performance Without Compromise

The Highest Resolution

Mercury II has user selectable resolutions from 5µm to 1.2nm linear, or 20k CPR to 268M CPR rotary. Users can set the interpolation level in integer steps for precise control.

Resolution	Linear	Rotary
	5µm to 1.2nm	20k CPR to 268M CPR

The Highest Accuracy

Mercury II gives you the high level of short-travel accuracy previously expected only from fine pitch glass systems.

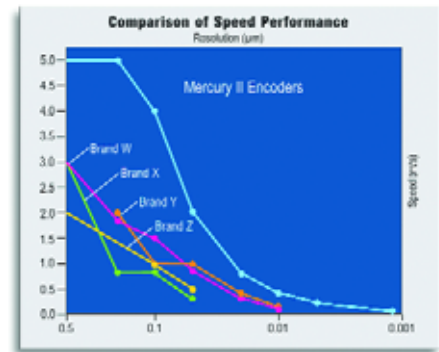
Accuracy:	Short travel*	Long travel
With Tape Scale (Linear)	≤ ±60nm mean, std. dev. 6nm	≤ ±5µm/m**
With Glass Scales (Linear)	≤ ±30nm mean, std. dev. 4nm	High accuracy grade: ≤ ±1µm for scales up to 130mm ≤ ±2µm for scales from 130mm to 1m Standard accuracy grade: ≤ ±1.5µm for scales up to 130mm ≤ ±5µm for scales from 130mm to 1m

*Interpolated accuracy within a 20µm signal period

**After two-point linearization in the customer's controller

The Highest Speed

Mercury II operates at speeds over two times faster than competitive encoders with A-quadrant output. For example, maximum speed at 0.1µm resolution is 4m/s; the closest competitor is 1.5m/s.



Mercury II can operate at speeds of 4m/s with a resolution of 0.1µm. That's over two times faster than competitive 20µm encoders using A-quadrant output, and accuracy is equivalent to a fine pitch system.

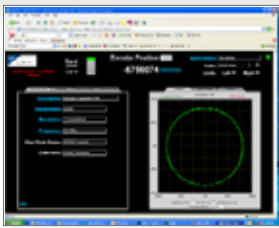
Versatility Without Compromise

- Same Sensor, Tape or Glass, Linear and Rotary
- Cut-to-Length Laser Tape up to 50 Meters in Length
- Stick-on Optical Index and Limit Markers
- Broadest Alignment Tolerances
- SmartPrecision™ II Software
- Programmable Resolution, Output Frequency and Alarms

With Mercury II, you get the smallest 1.2nm capable sensor. You get laser tape or glass, linear and rotary scales. You get adhesive-mount laser tape in continuous lengths up to 50 meters, and the only stick-on optical index and limit markers. You get the widest alignment tolerances, plus instrument free setup. Finally, setup programmability, monitoring, and diagnostic capabilities are standard with SmartPrecision II Software.

The Best Features of Tape and Glass, Plus Stick-on Optical Index and Limit Markers

Only Mercury II lets you use the same sensor with PurePrecision laser tape for convenience, or with linear and rotary glass scales for the highest accuracy. What's more, our stick-on optical index achieves bi-directional repeatability of 1 LSB at full speed. Index and limit markers will work with both laser tape and linear glass scales.



SmartPrecision™ II Software for Unmatched Programmability, Monitoring and Diagnostics

Mercury II offers the most advanced software in the industry.

SmartPrecision II Software enables programmable resolution, encoder setup, and real time monitoring from a web browser, plus alarms and analysis using a variety of data plots.

Robustness Without Compromise

- New Optical Design
 - Contamination Resistant
 - Automatic Gain Control
- Best-in-Class Noise Immunity
 - Digital Output from Sensor
 - Double-Shielded Cable
 - Differential Output from Encoder
- Fail-safe Discrete Left and Right Limits
- Gain, Offset & Phase Correction

Mercury II was designed for robust operation under a wide range of conditions. We took a system-wide approach, starting with a completely new sensor design that resists scale contamination and electromagnetic interference. In addition, we designed new SmartPrecision II electronics to compensate instantaneously for any signal variations.



New Sensor Design

The new optical design provides contamination resistance to oil films, fingerprints, dust, and more. AGC circuitry instantly compensates for signal variations.

Best-in-Class Noise Immunity

Digital output from the sensor to the interpolator makes Mercury II ideal for high PWM/EMI noise applications, supporting cable runs up to 5 meters from the sensor and 10 meters from the interpolator to the controller.

Fail-safe Limits

Mercury II has fail-safe left and right limits with outputs to dedicated pins for easy integration with your controller.

Gain, Offset and Phase Correction

Mercury II ensures the highest accuracy with automatic signal optimization, and real-time signal processing algorithms.

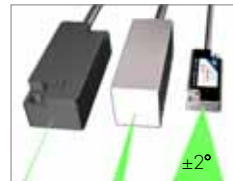
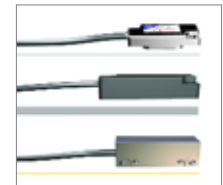
Unsurpassed Ease of Use

- Low Z-Height Sensor
- Broadest Alignment Tolerances
- Pushbutton Setup
- Stick-on Optical Index and Limit Markers
- PurePrecision Laser Tape in Continuous Lengths

No encoder is easier to use than Mercury II. Its low Z-height sensor fits where many others cannot. Its broad alignment tolerances ensure fast, easy sensor alignment. Stick-on optical index and limit markers make installation or customization very user friendly. Finally, cut-to-length laser tape eliminates lead-time issues, making it quick and easy to manufacture motion systems with a variety of travel lengths.

Low Z-Height Sensor

Mercury II has the smallest digital sensor capable of resolution down to 1.2nm. At just 8.7mm tall, this enables smaller, faster, less costly motion system designs.



Broadest Alignment Tolerances for Easy Installation and Setup

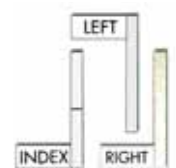
Mercury II has the broadest alignment tolerances in the industry, a full ± 2 degrees. That makes it the easiest and the fastest sensor to align and setup. No instrumentation is needed; you can align the Mercury II sensor in under 30 seconds.

Pushbutton Setup

Mercury II's pushbutton setup, along with built-in setup and status LEDs, make sensor, index, and limit setup fast. Ancillary setup equipment is eliminated.

Stick-on Optical Index & Limits for Tape & Glass Scales

Mercury II's stick-on optical index is bi-directional and repeatable to 1 Least Significant Bit at full speed. Install index and limit markers on laser tape or linear glass scales.



PurePrecision Laser Tape in Continuous Lengths up to 50 Meters

Laser tape scale reduces inventory costs and long lead times. The unique dispenser is convenient for cutting tape scale to length and for storage.

Mercury II™: The Next Generation

Performance and Features at a Glance

System Performance at a Glance

Resolution	Linear	Rotary
	5µm to 1.2nm	20k CPR to 268M CPR
Accuracy:		
	Short travel*	Long travel
With Tape Scale (Linear)	≤ ±60nm mean, std. dev. 6nm	≤ ±5µm/m**
With Glass Scales (Linear)	≤ ±30nm mean, std. dev. 4nm	High accuracy grade: ≤ ±1µm for scales up to 130mm ≤ ±2µm for scales from 130mm to 1m Standard accuracy grade: ≤ ±1.5µm for scales up to 130mm ≤ ±5µm for scales from 130mm to 1m

*Interpolated accuracy within a 20µm signal period **After two-point linearization in the customer's controller

- Speeds up to 4m/s at 0.1µm resolution
- Bi-directional optical index with 1 LSB repeatability at full system speed
- High tolerance to contamination for robust performance
- Digital signals from sensor for high PWM noise immunity

System Features at a Glance

- Smaller - 8.7mm tall sensor fits tight spaces
- Faster - high speed at high resolution for high performance
- Smarter - programmable resolution in integer steps for motion loop tuning and system flexibility
- Versatile - same sensor: tape, glass, linear or rotary scales for reduced inventory costs; cut-to-length PurePrecision laser tape ends long lead times
- Easier - tape scale with stick-on optical index and limits cuts system installation time and adds flexibility
- Fail-safe, dedicated left and right limits for system safety
- Broadest alignment tolerances for easy setup with integral signal strength and index LEDs
- Programmable alarms for easy diagnostics
- Differential outputs for reliability in high EMI environments
- Optional software with Ethernet connectivity for encoder setup, programmable features, monitoring and diagnostics
- Manufactured in ISO 9001:2000 certified facilities
- RoHS compliant

The Sensor

The Smallest and Most Versatile High-Performance Sensor

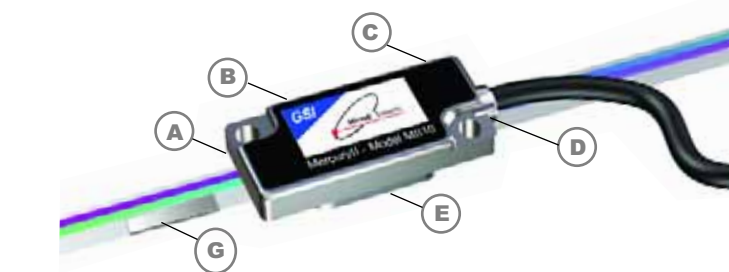
A Compact Z Height Design
Mercury II's sensor is only 8.7mm high, enabling more compact motion system designs.



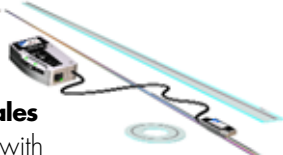
B Broadest Alignment Tolerances in the Industry
Mercury encoders were always the easiest to align. Our next-generation sensor design has the widest Z and theta-Z tolerances for fast setup.




C Next-Generation Sensor for Resistance to Contamination
Mercury II sensor has an improved optical design for contamination resistance: fingerprints, oil, dust, etc.

D Digital Signal from the Sensor for Unsurpassed Noise Immunity
Mercury II provides digital signals directly from the sensor to the interpolator. Other encoders output an analog signal to the interpolator that is susceptible to PWM noise and EMI/RFI interference.



E One Sensor: Tape or Glass, Linear or Rotary Scales
The Mercury II sensor works with metal tape or glass scales in linear and rotary applications. Nothing else gives you this flexibility. Mercury II will reduce design time, manufacturing, and field support costs.





The Tape Scale

F PurePrecision™ Laser Tape, the Next Generation Tape Scale

PurePrecision laser tape is the easiest tape to install and use. Cut it to any length you need; adhesive backing and our unique application tool make installation fast and accurate. The tape is available in a dispenser up to 50 meters in length, or you can order pre-cut lengths if you prefer. PurePrecision laser tape is an easy way to reduce both manufacturing costs and long lead times.



G The Only Stick-On Optical Index and Limits

Cut-to-length tape scales require an adjustable index. Hall sensors are too large and too hard to install. Mercury II solves this problem with the first and only stick-on optical index and limits. Place the markers along the tape scale for unmatched flexibility, or use them with glass scales for rapid prototyping. The in-track bi-directional optical index provides 1 LSB repeatability and operates at all encoder speeds. Separate fail-safe left and right optical limits also enhance motion system safety and reduce cabling.



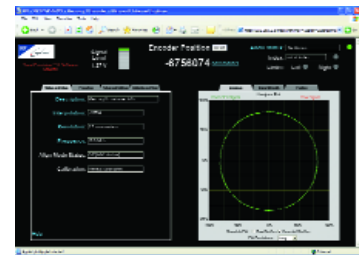
The Electronics

H SmartPrecision II Electronics Give You Superior System Flexibility

Mercury II provides leading edge technology that enables advanced features: user programmable or factory-set resolution, output bandwidth and alarms; gain, offset, and phase error compensation; and auto-calibration. Pushbutton setup of the sensor, index, and limits, combined with built-in LED's for setup and status, eliminates oscilloscopes, and setup modules.

I SmartPrecision II Software Gives You Programmable Performance and Remote Ethernet Connectivity

The optional SmartPrecision II Software works in concert with the SmartPrecision II interpolator electronics, allowing encoder setup and diagnostics using programmable features, data plots, and real-time indicators. It adds Ethernet connectivity for secure remote monitoring and control via an Internet connection, and it allows users to view and control all parameters remotely – even from multiple locations, simultaneously.



Four Models to Meet Your Performance Needs

Linear Resolution Range	Mercury II Encoder Models				Rotary Resolution Range
	MII 4800	MII 4600	MII 4500	MII 4400	
1.2 nm	✓	✓	✓	✓	268 M CPR
5.0 nm	✓	✓	✓	✓	65.5 M CPR
20 nm	✓	✓	✓	✓	16.4 M CPR
50 nm	✓	✓	✓	✓	6.6 M CPR
0.1 μm	✓	✓	✓	✓	3.3 M CPR
0.5 μm	✓	✓	✓	✓	656 k CPR
1.0 μm	✓	✓	✓	✓	328 k CPR
5.0 μm	✓	✓	✓	✓	66 k CPR

Choose from four models to meet your application requirements. Resolutions are field programmable in integer steps within the range shown for each model.

PurePrecision™ Laser Tape and Glass Scales

For Easy Installation and Superior Performance, Mercury II™ is the Only Encoder that Works with Tape or Glass, Linear or Rotary Scales

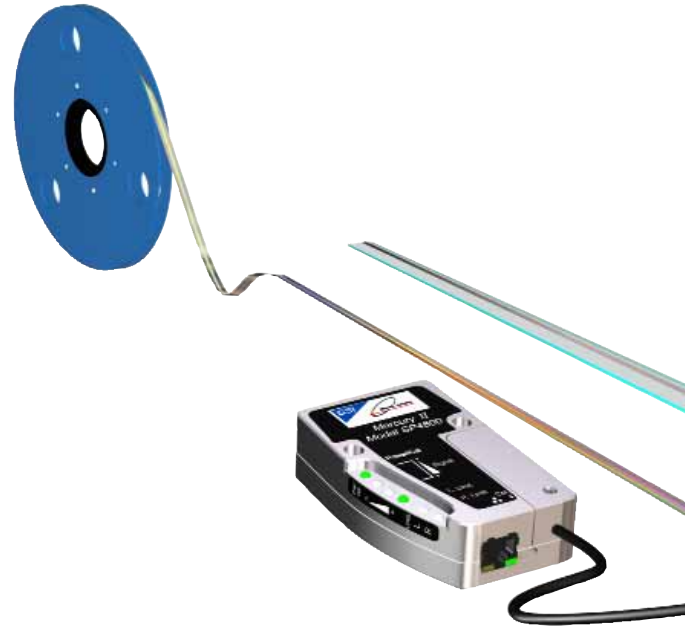
Tape & Glass Features at a Glance

- Sensor works with tape or glass, linear or rotary scales cutting lead times and reducing inventory costs
- Easiest tape to use – cut to length and install using convenient application tool, saving time and reducing costs
- PurePrecision laser tape comes in lengths up to 50m, saves on lead time; available in pre-cut lengths
- Exclusive stick-on optical index and limits – easy to install, saves time, and saves space; tape scale width is industry standard 6mm
- Stick-on index and limit markers also work on glass scales, ideal for rapid prototyping
- High contamination tolerance for robust performance
- Glass scales for highest accuracy and thermal stability
- Custom glass scales – special widths, thicknesses, diameters, or rotary arc segments for OEM orders

The Best Tape Solution Available

Easy to Install, Easy to Setup, Easy to Customize

PurePrecision laser tape scale sets a new standard in flexibility and ease of use. There is no need to mount a tape installation tool. There are no index magnets to adjust, and there are no long lead times, since you only need to inventory one dispenser of tape scale for all of your applications. The PurePrecision laser tape scale system has solved these problems. How does this compare with your current encoder?



Easy Tape Installation

Step One:

Apply Tape to Substrate

Simply cut the desired length from the dispenser, feed it into the installation tool, and roll it out along a benching edge. The tool peels off the tape scale's adhesive backing and applies uniform pressure over the tape scale's surface as it is rolled out. The tape can then be fixed at its ends, matching it to the thermal performance of the substrate.

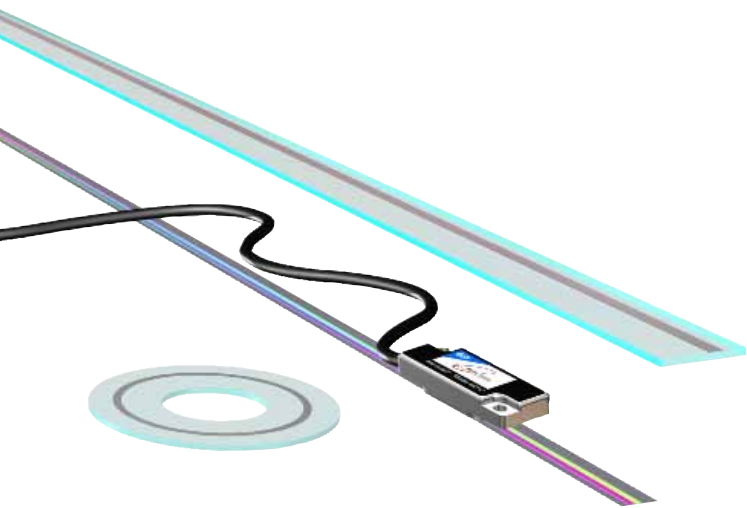
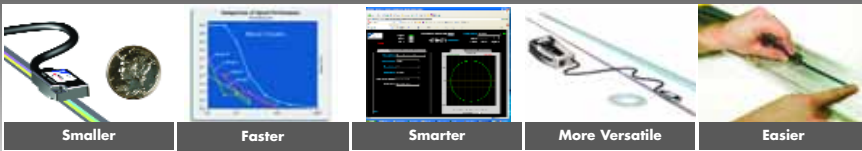


Step Two:

Apply Stick-On Bi-directional Optical Index and Limits

Mercury II lets you place the index and limits where you need them. There is no need to mix epoxy or drill holes to mount bulky magnets or limit switches. Mercury II's markers provide ultra-precision at high speed, achieving index repeatability of 1 LSB at full speed. They even work on linear glass scales.

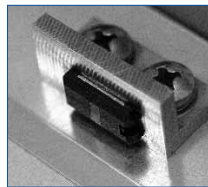




The Best Index & Limit Solution

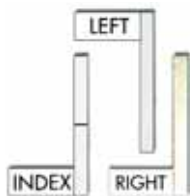


Mercury II™



Other encoders

Unlike other encoders, Mercury II's stick-on optical index and limits require no additional space. They mount directly on the 6mm tape scale, the industry standard width. Other encoders using adjacent Hall sensors require twice the width. Simply detach, place on the tape scale, and peel off the blue covering - no screwdrivers, no adjustments.



Mercury II Installation Kit and Accessories

Tape Application Tool

The tape installation tool is easy to use. Just place the tape against a machined surface and use the tool to roll it onto the substrate along a benching edge. The tool requires no mounting and ensures fast, accurate, consistent results.



Mercury II Cut-to-Length Tape

Mercury II PurePrecision laser tape has a 20µm pitch and is sold in continuous lengths up to 50 meters in length. The convenient dispenser makes cutting to length easy and provides secure storage.

Mercury II Tape Installation Accessory Kit

The tape installation accessory kit contains everything you need: Shears, installation tool, spare index and limit markers, end caps, epoxy, finger cots, and more.



Glass Scales for Highest Precision



Mercury II's 20µm pitch glass scales are available in lengths from 10mm to 1m; rotary diameters range from 44mm to 121mm. Custom scales are also available: rotary arc segments, non-standard dimensions, larger diameters, and customer-defined index and limit configurations. Use glass scales when you need:

- Accuracy to ±1µm
- Uniform thermal behavior
- Ultra-smooth velocity control
- Short travel lengths
- Custom configurations
- Rotary scales

Stick-on Index and Limit Markers Are Ideal for Prototyping with Linear Glass Scales

The Mercury II index and limit markers are ideal for prototyping if your application calls for the accuracy only glass scales can deliver. Once you have proven your design, we can create custom glass scales with pre-printed index and limits for your OEM application.



GSI

A World of Enabling Technologies

Bringing Your Advanced Manufacturing Applications to Life

Enabling Technology

To learn more about Mercury encoders, or other MicroE Systems products, visit: www.microesys.com.

To learn more about GSI Group, visit our corporate web site: www.gsig.com.

MicroE Systems is a world leader in optical encoder technology with offices in major industrial centers around the globe. As one of fourteen product brands that comprise GSI Group, we deliver enabling technology that brings advanced applications to life in the motion control, medical, semiconductor, electronics, and industrial markets.

HEADQUARTERS

MicroE Systems

8 Erie Dr.
 Natick, MA 01760 USA
 Tel: 508 903 5000
 Fax: 508 903 5005
www.microesys.com
 Email: info@microesys.com

