

목록

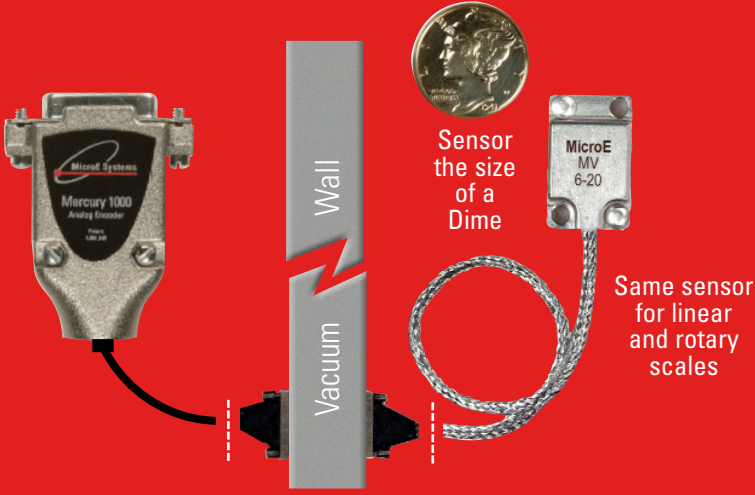
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Mercury™ 1000V: Vacuum Rated Analog Encoder

For Customer Interpolation- Resolution to 0.078µm; Rated to 10⁻⁸ Torr

Reflective Linear and Rotary Vacuum Encoders

Typical Vacuum Encoder System



Sensor the size of a Dime

Same sensor for linear and rotary scales

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

Vacuum

10⁻⁸ Torr

The New Mercury 1000V encoder represents the next level of encoder performance. With smallest sensor size, easiest alignment and 10⁻⁸ Torr vacuum rating, the M1000V delivers Best-in-Class performance. Shown with customer-supplied vacuum-wall connectors.

Imagine what you can do with this!

The new Mercury 1000V can reduce the cost and size of your system, and improve its performance all at once! MicroE Systems' Mercury 1000V kit encoders are smaller, higher performance, faster to install, and easier to set up and align than any other encoder. The tiny sensor fits into very tight spaces and works in both linear and rotary applications. The M1000V sensor is vented and constructed with vacuum compatible materials and designed for a 48 hour bake out at 150°C. Color coded bare leads are provided for customer termination.

Standard features

- Small sensor with ultra-low Z height; flush screw mounting
- Sensor is 8.4mm (H) x 12.7mm (W) x 20.6mm (L) and weighs 1.6g
- SmartPrecision automatic offset and gain set up
- Analog Sine/Cosine output and Index window
- 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
- Bi-directional index signal
- Index mark at the center or end of the glass scale (linear)
- Alignment Tool enables fast set up (Required, see pg 6 for ordering info.)

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Required accessories

- SmartPrecision Alignment Tool

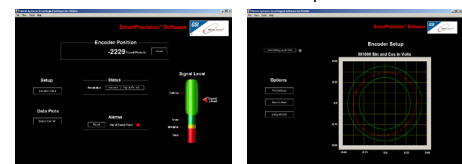


Optional features

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



- Vacuum cable length of 1.5m or custom
- SmartPrecision Software for set up



System Configurations

Standard and Optional Equipment

Encoder Sensor
Same for linear and rotary scales.



Shielded Vacuum Cable
Supplied with 1.5m standard length and color-coded bare leads for customer termination.



M1000 Encoder System Standard Equipment

Controller Interface Cable
the cable includes a 15 pin standard D-sub connector with SmartPrecision™ electronics for automatic gain and offset adjustments.

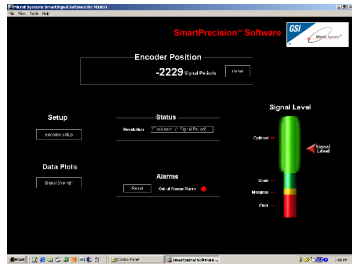


The standard cable is double shielded and 0.5m in length. The cable contains color-coded bare leads for customer termination.

SmartPrecision™ Alignment Tool
Required for set up, the built-in LED indicators make alignment fast and easy, eliminating the need for an oscilloscope. In addition, SmartPrecision gain and offset are automatically adjusted to optimize accuracy.

RS 232 Interface Adaptor
The adaptor provides power to the encoder and connections to a PC and the controller. Included with the Alignment Tool.

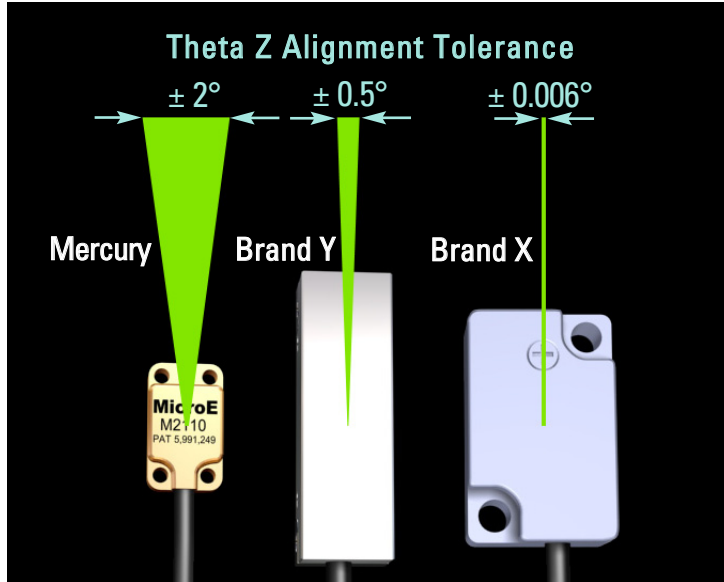
Optional Software



SmartPrecision™ Alignment Software
Optional software lets you view signal strength, Lissajous plots, position data and diagnostics.

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 ± 2° 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	± 0.15mm	± 0.1mm	± 0.1mm	Mercury is 50% better
Y	± 0.20mm for linear ± 0.10mm for rotary ≥19mm dia.	± 0.1mm	unspecified	Mercury is 100% better
theta X	± 1.0°	unspecified	± 1.0°	
theta Y	± 2.0°	± 0.1°	± 1.0°	Mercury is 100% better
theta Z	± 2.0°	± 0.006°	± 0.5°	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

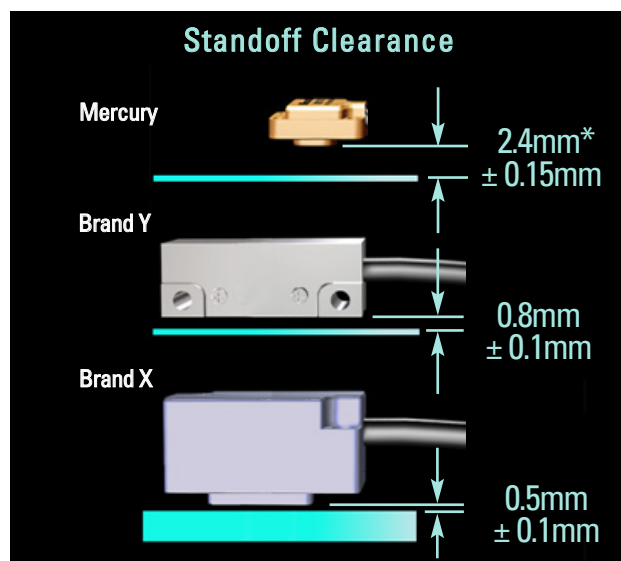
Mercury's sensor height is 44% shorter than competitive encoders, making it easy to fit into your design. This reduction can also cut total system weight and cost by allowing the use of smaller motors and stages. Safe system operation is also enhanced thanks to Mercury's generous standoff clearance— 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	± 0.15mm	± 0.1mm	± 0.1mm	50% better
System height	11.7mm	28.5mm	15.8mm	26% better

**Based on published specifications



* 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 2500 - 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
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*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:	20.57mm	0.810"
H:	8.38mm	0.330"

Operating and Electrical Specifications

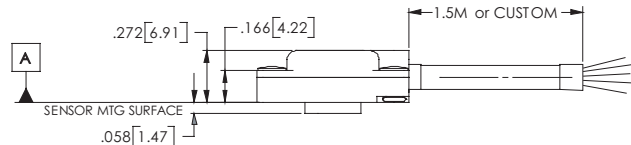
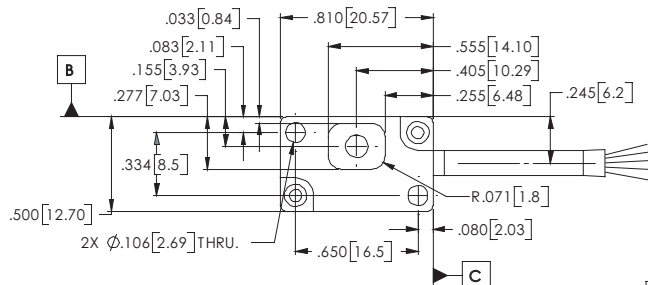
Vacuum	10 ⁻⁸ Torr, negligible outgassing
Bake Out	Up to 150°C; up to 48 hours, non-operating
Power Supply	5VDC ±5% @ 60mA
Temperature	
Operating:	Sensor: 0 to 70°C
Storage:	-20 to 70°C
Humidity:	10 - 90% RH non-condensing
Shock:	1500G 0.5ms half sine
Sensor Weight:	2.7g (Sensor without cable)
Cable:	The 1.5m vacuum-compatible cable is EMI shielded and comes standard with bare leads for customer termination within the vacuum bulkhead. Custom cable lengths and connectors are available.

Maximum Speed

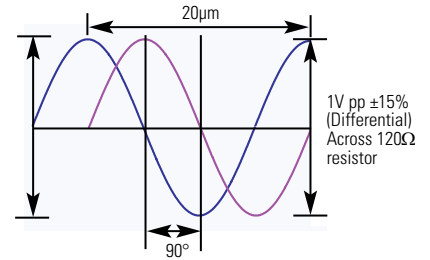
	Scale Length/Diameter	Maximum Speed*
Linear	All Lengths	7200mm/s
Rotary	0.75"	8640 RPM
	1.25"	5272 RPM
	2.25"	2637 RPM
	4.25"	1318 RPM

*Assumes customer electronics have adequate bandwidth

Mechanical Information - Sensor



Analog Output Pins 7,8,14 and 15

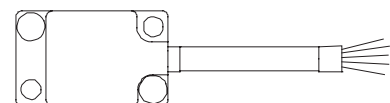
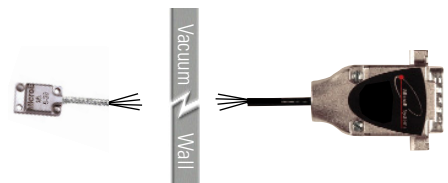
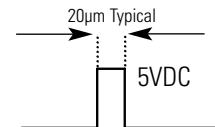


Mercury 1000V Outputs

15-pin Standard Male D connector

PIN	FUNCTION
1	Index Window-
2	Index Window+
3	Reserved - do not connect
4	Reserved - do not connect
5	Reserved - do not connect
6	Reserved - do not connect
7	Cosine+
8	Sine+
9	Reserved - do not connect
10	Reserved - do not connect
11	Reserved - do not connect
12	+5V
13	Ground
14	Cosine-
15	Sine -

Index Window Pin 2



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:

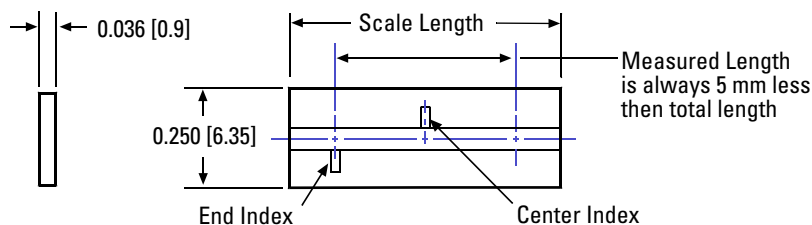
- *Standard linear*: 18mm - 2m
- *Standard rotary*: 12mm - 107.95mm diameter, with or without hubs
- *Custom linear**: special lengths, widths, thickness, index mark locations and special low CTE materials
- *Custom rotary**: special ID's, OD's (up to 304.8mm), index mark outside the main track and special 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

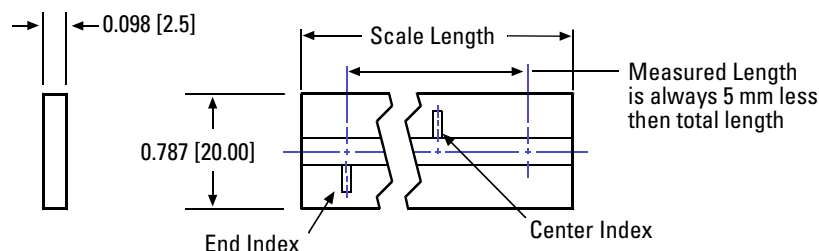
Model	L18	L30	L55	L80	L105	L130
Scale Length	0.709 [18]	1.181 [30]	2.165 [55]	3.150 [80]	4.134 [105]	5.118 [130]
Measured Length	0.512 [13]	0.984 [25]	1.969 [50]	2.953 [75]	3.937 [100]	4.921 [125]

Custom scales available

Standard Long Linear Scales

155mm and Longer

Key: inches[mm]



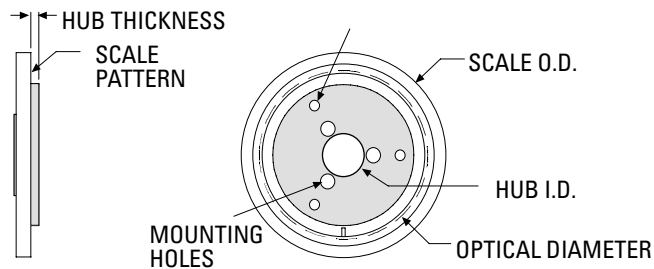
Specifications

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 +0.0005/-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 1000V Encoder Systems

To specify your Mercury encoder with the desired scale, cable length and software, 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 Encoder): M1000V-MV-L55-C1 Example (Rotary Encoder): M1000V-MV-R1910-HA

M1000V-MV – Scale Model – Scale Mounting
 | | |
 MV = 1.5m cable Lxxx or Rxxxx For linear scales:
 C1 = 3 scale clamps*
 C2 = 10 scale clamps**

* 3 clamps come standard with linear scales up to 130mm
 ** 10 clamps come standard with linear scales 155mm or longer
 Note: Scale mounting clamps are not vacuum rated.

Hubs for Rotary Scales:
 NH = Without Hub
 HE = for R1206
 HA = for R1910
 HB = for R3213
 HC = for R5725
 HD = for R10851

How to Order SmartPrecision Alignment Tool

Required for M1000V setup

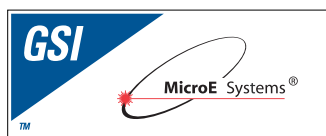
Example: Alignment Tool for Mercury 1000 encoder, 120 VAC = SSAT1000-120

SSAT1000 – Voltage
 |
 120 = 120 VAC, 60Hz US Std. 2-prong plug
 220 = 220 VAC, 50Hz European Std. 2-prong plug

How to Order SmartPrecision Software

SmartPrecision Software
 |
 SSWA120 for 120 VAC, 60Hz
 US Standard 2-prong plug
 or
 SSWA220 for 220 VAC,
 50 Hz European Std. 2-prong plug

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



Mercury™ 1000V - Vacuum Rated

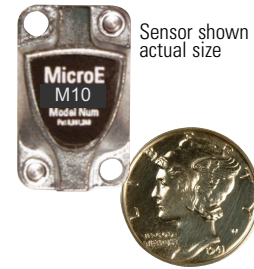
Analog Output Encoder System

*Installation Manual
and Reference Guide*



Introduction

MicroE Systems was founded to advance encoder technology to a level never before achieved. Our objective was to design encoder systems that would be small enough to fit into densely packed OEM equipment designs, affordable enough for cost-sensitive applications and easy enough to enable installation, setup and alignment by assemblers with little training. We are pleased to say that all of these goals have been realized with the introduction of the Mercury family of encoders.



Precautions



- 1 Follow standard ESD precautions. Turn power off before connecting the sensor. Do not touch the electrical pins without static protection such as a grounded wrist strap.
- 2 Do not touch the glass scale unless you are wearing talc-free gloves or finger cots. Please read this installation manual for full instructions.

LASER SAFETY INFORMATION: Mercury & ChipEncoder

This product is sold solely for use as a component (or replacement) in an electronic product; therefore it is not required to, and does not comply with, 21 CFR 1040.10 and 1040.11 which pertain to complete laser products. The manufacturer of the complete system-level electronic product is responsible for complying with 21 CFR 1040.10 and 1040.11 and for providing the user with all necessary safety warnings and information.

MicroE encoders contain an infrared laser diode or diodes. Emitted invisible laser radiation levels have been measured to be within the CDRH Class 1 range, which is not considered hazardous; however, to minimize exposure to the diverging beam, the encoder sensor should be installed in its operational configuration in close proximity to the encoder scale before power is applied.



- Invisible laser radiation; wavelength: 850 nm
- Max power 2.4 mW CW (4.8 mW CW for Mercury II™)
- CAUTION – The use of optical instruments with this product will increase eye hazard. DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS (MICROSCOPES, EYE LOUPES OR MAGNIFIERS).
- All maintenance procedures such as cleaning must be performed with the MicroE encoder turned off.
- Do not insert any reflective surface into the beam path when the encoder is powered.
- Do not attempt to service the MicroE encoder.

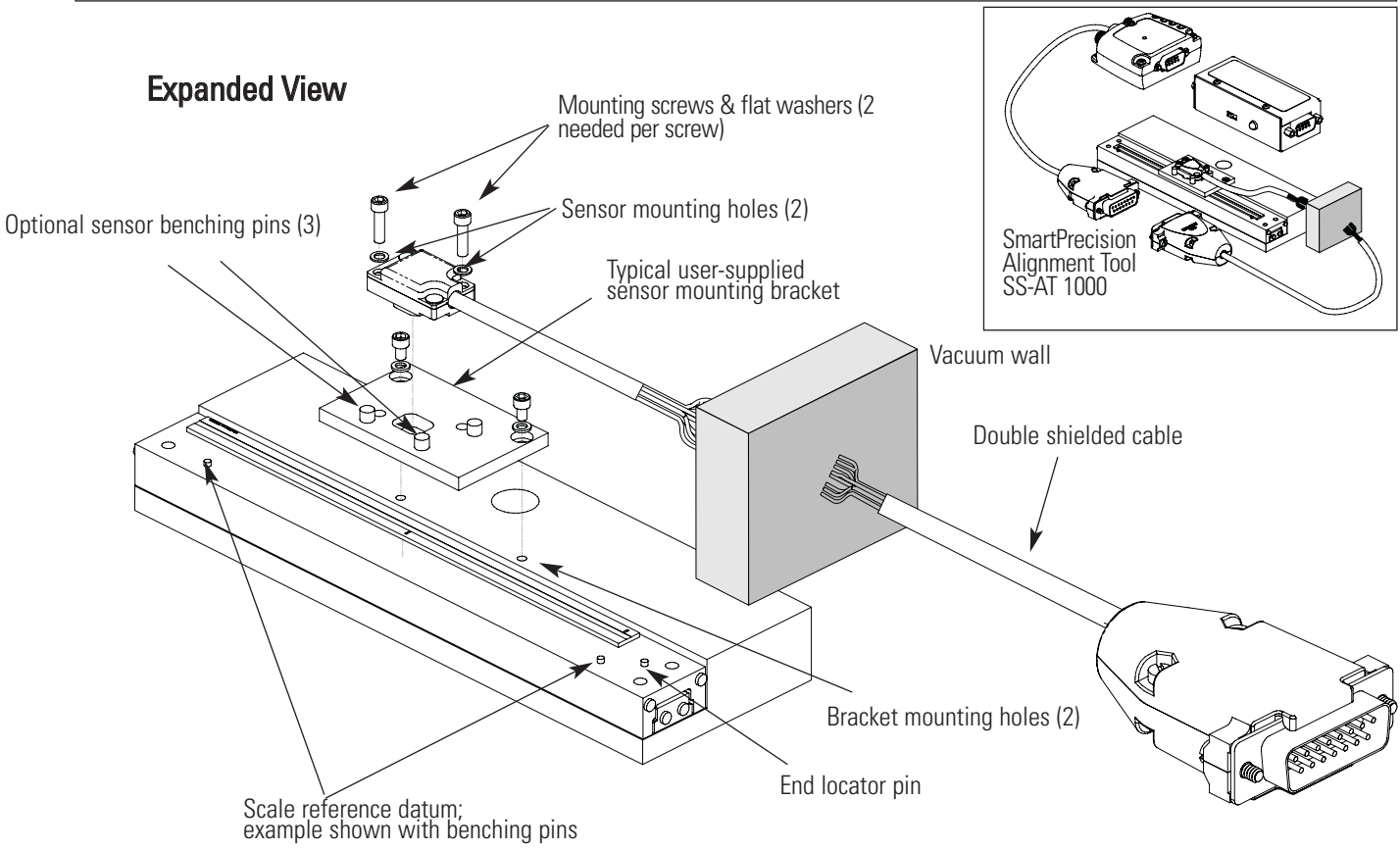
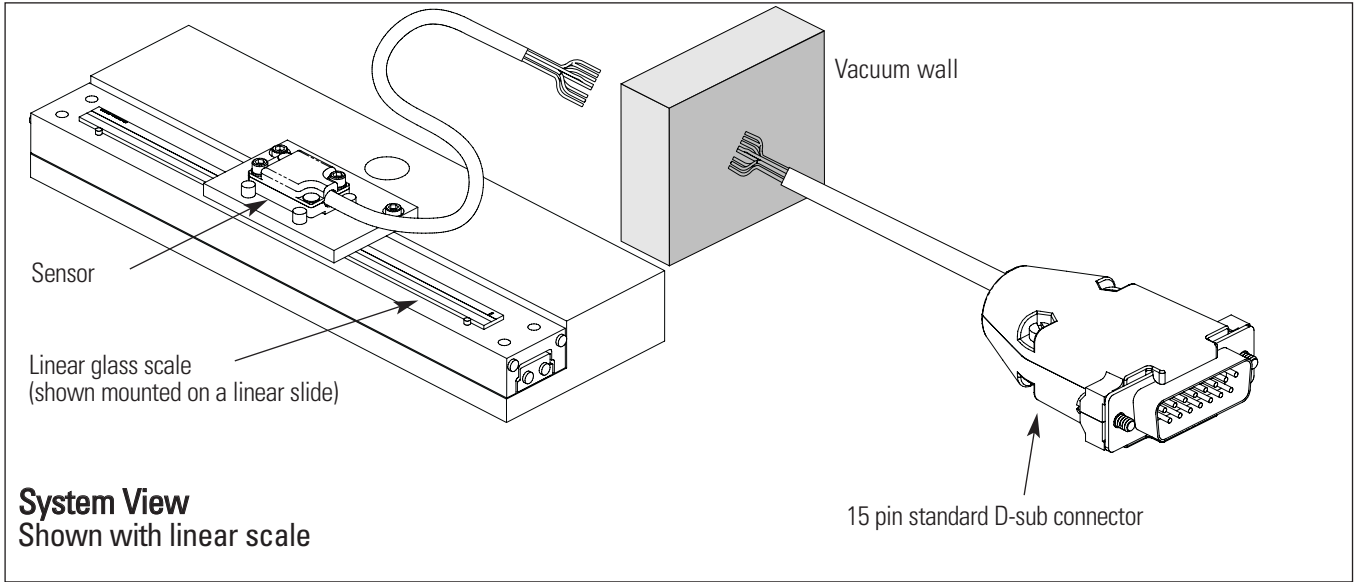
Patents

Covered by the following patents: US 5,991,249; EP 895,239; JP 3,025,237; US 6,897,435; and EP 1,451,933. Additional patents and patents pending may apply.

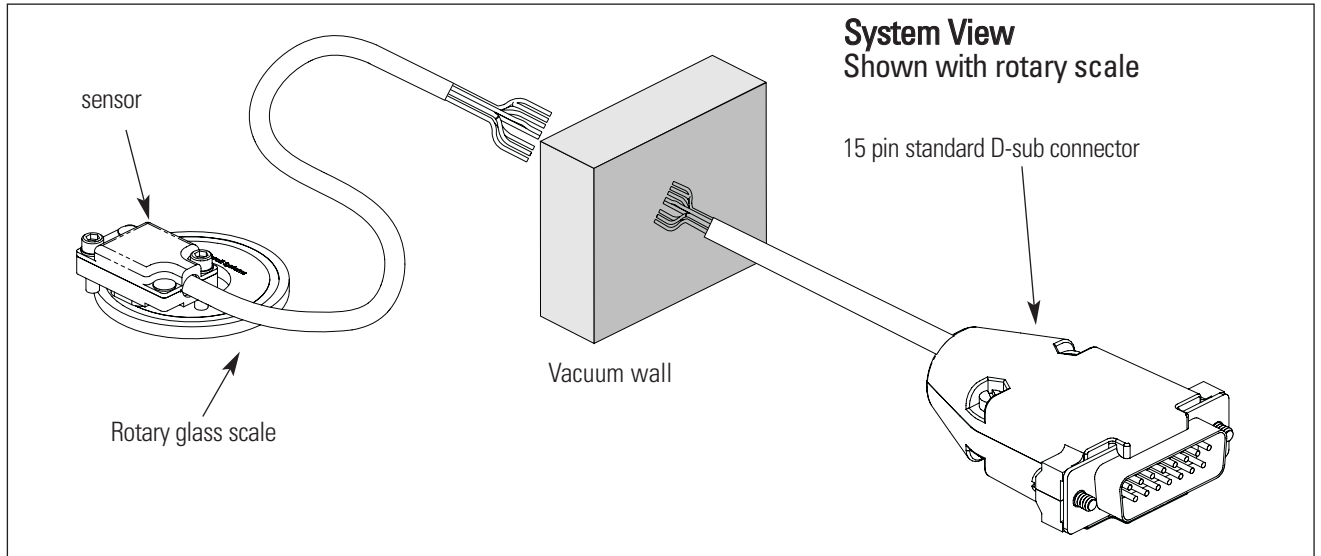
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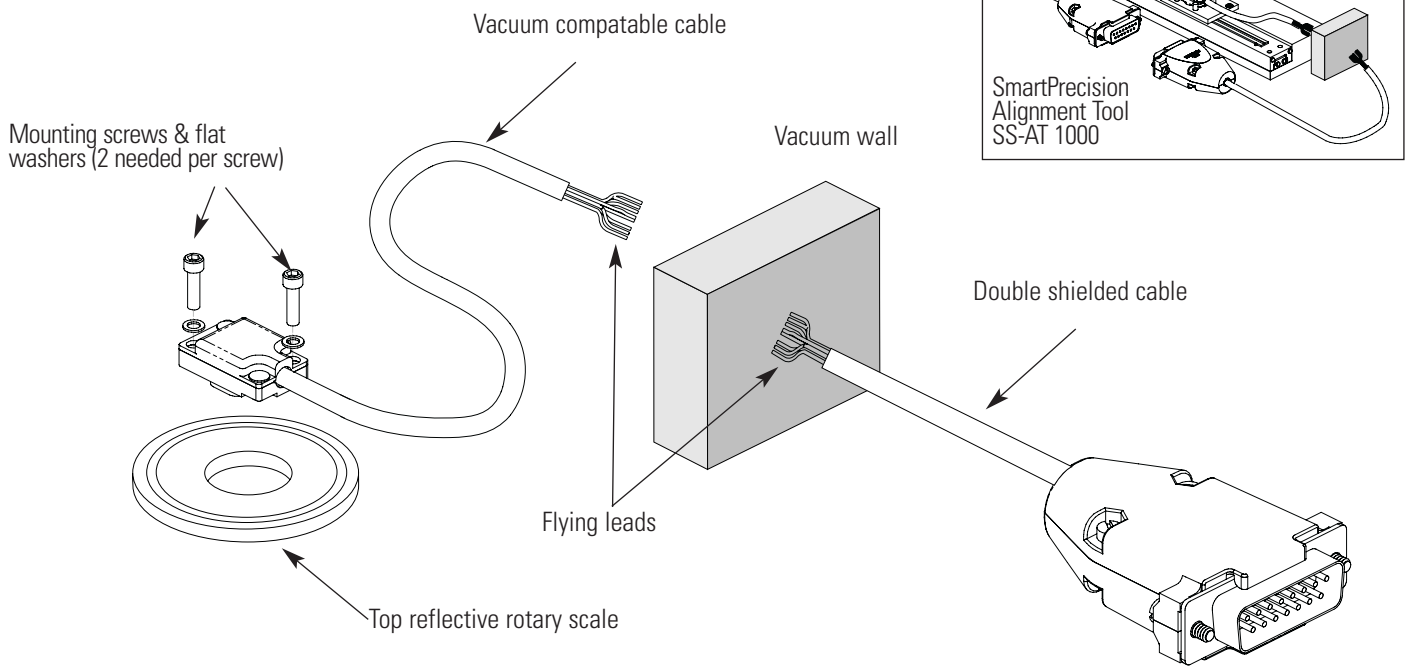
Mercury 1000V Analog Encoder System with Linear scale



Mercury 1000V Analog Encoder System with Rotary scale



Expanded View



Installation Instructions

Linear Encoders

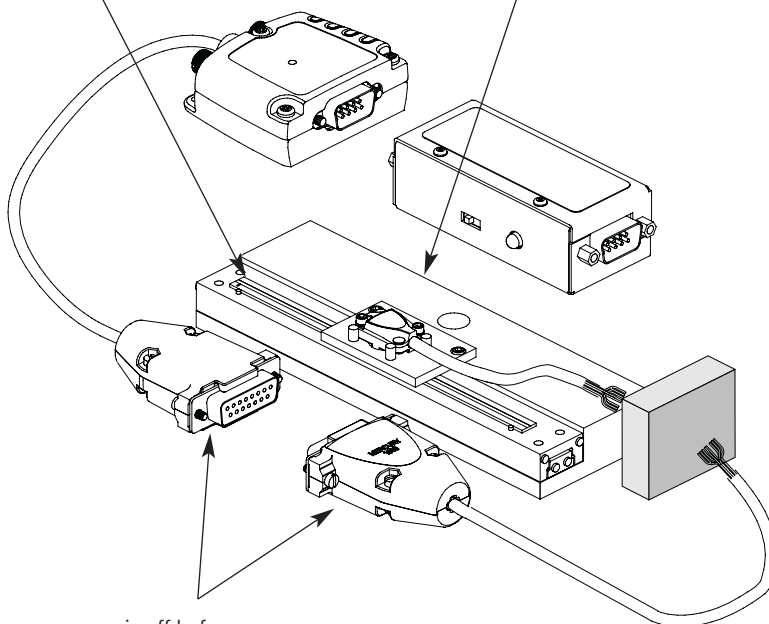
1 Attach the scale to the base slide. Reference the preferred datum on the interface drawing for either end or center index orientation.

Depending on the mounting method, attach the scale to the slide with adhesive. Refer to pg. 8 for details.

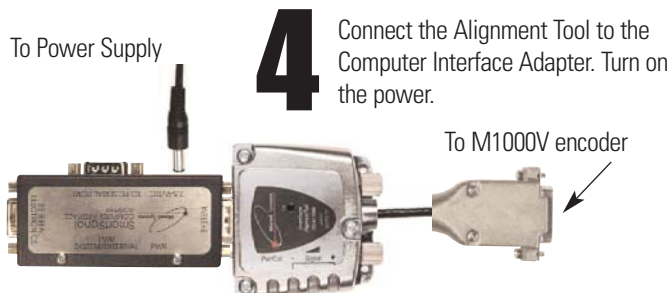
Be sure the grating surface of the scale faces the sensor. Insure that there is no contact between these surfaces or damage may result.

2 Install the sensor on your mounting surface referencing the appropriate datum surface as shown on the interface drawing. Use 2 washers per mounting screw.

Benching pins may be used to locate the sensor if the system mechanical tolerances are adequate. See data sheet for alignment tolerances, or keep mounting screws loose for sensor alignment if benching pins are not used.



3 Be sure the source power is off before connecting the SmartPrecision Alignment Tool. Connect the M1000V to the SmartPrecision Alignment Tool



Installation Instructions

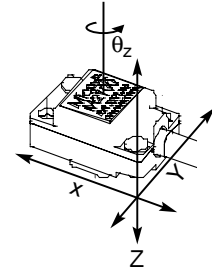
Linear Encoders

5

Proper sensor alignment may require minor adjustments to the sensor position with respect to the scale. This can be performed easily using the SmartPrecision Alignment Tool as illustrated below.

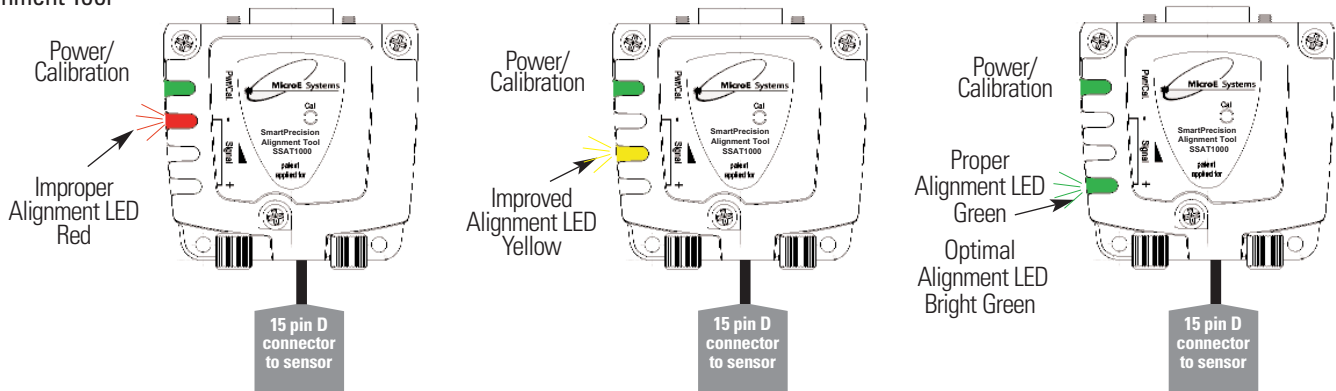
The red, yellow, or green LED will light depending on sensor alignment. Slowly move the sensor by allowing it to slide on the mounting surface until the green LED, is illuminated. Optimal alignment will be displayed as a "Bright Green" LED.

IMPORTANT: Confirm that the green LED blinks when passing over the index. If not, readjust the sensor in the Y direction and repeat the above procedure. When alignment is completed, tighten the sensor mounting screws.



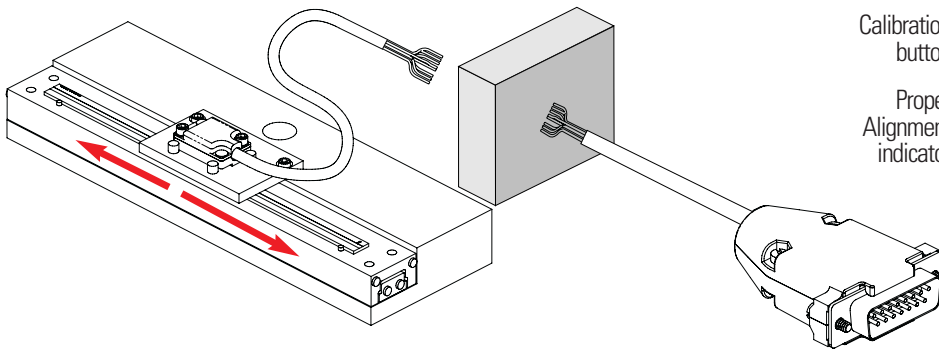
To align the sensor, move it in the Y or θ_z directions.

SmartPrecision Alignment Tool



6

Confirm green over the full range of motion by sliding the scale past the sensor. The "green" LED must remain on over the entire range. If not aligned over the entire range of motion, loosen the sensor mounting screws and repeat step 5.



7

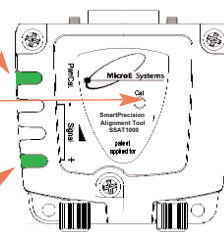
IMPORTANT OUTPUT CALIBRATION PROCEDURE

This procedure must be completed for proper system operation each time the sensor is aligned.

Push the Calibration button inside the SS-AT 1000 body with a small diameter shaft, such as a bare cotton swab. This will set the gain and offset of the M1000V, producing a 1V_{pp} output*.

The Power/Calibration indicator will flash continuously. Move the scale past the sensor over a distance of at least 7mm (1/4"). Do not run off the end of the scale. When the calibration procedure is complete, the Power/Calibration LED stops flashing.

Power/Calibration indicator
Calibration button
Proper Alignment indicator

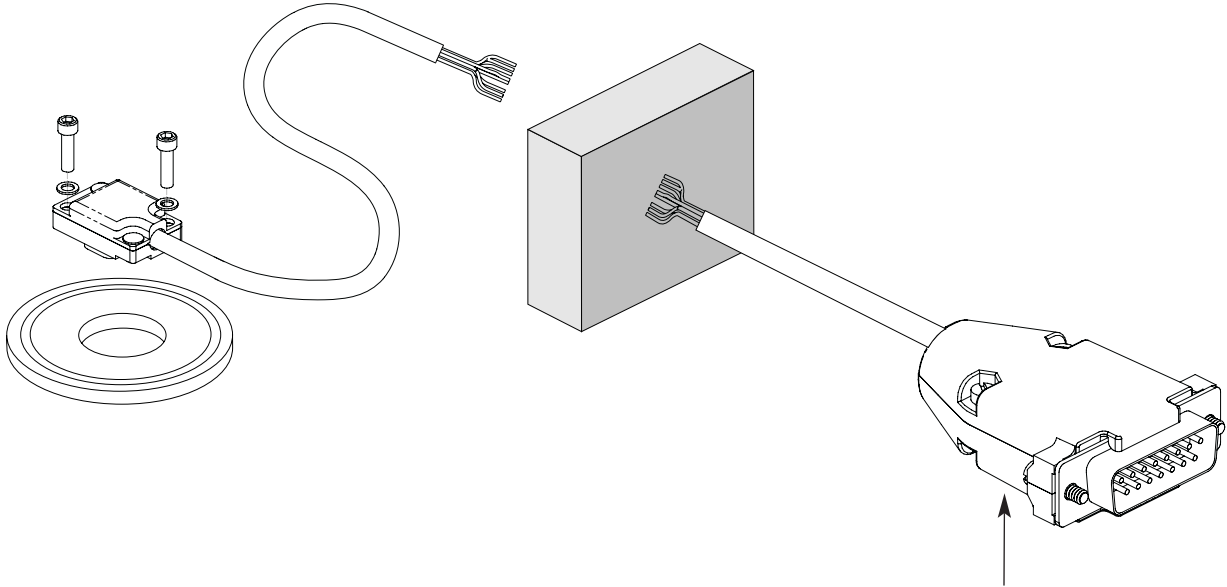


* ±15% (Differential) across 120Ω resistor

Installation Instructions

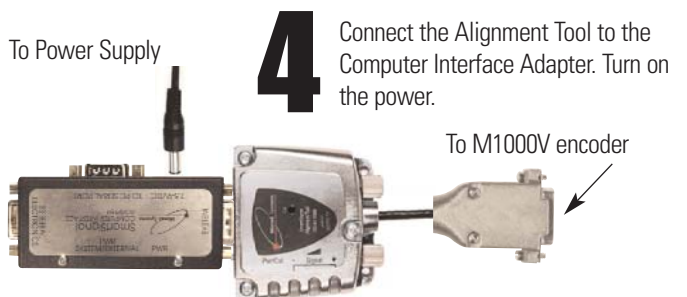
Rotary Encoders

- 1** Attach your hub/scale assembly to the rotary device. Refer to the interface drawing. The reflective surface of the scale must face the sensor.



- 3** Be sure the source power is off before connecting the SmartPrecision Alignment Tool. Connect the M1000V encoder to the SmartPrecision Alignment Tool.

- 2** Install the sensor on your mounting surface referencing the appropriate datum surface as shown on the interface drawing. Use 2 washers per mounting screw. Benching pins may be used to locate the sensor if the system mechanical tolerances are adequate. See data sheet for alignment tolerances, or keep mounting screws loose for sensor alignment if benching pins are not used.



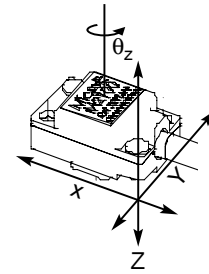
Installation Instructions Rotary Encoders

Proper sensor alignment may require minor adjustments to the sensor position with respect to the scale. This can be performed easily using the SmartPrecision Alignment Tool as illustrated below.

5

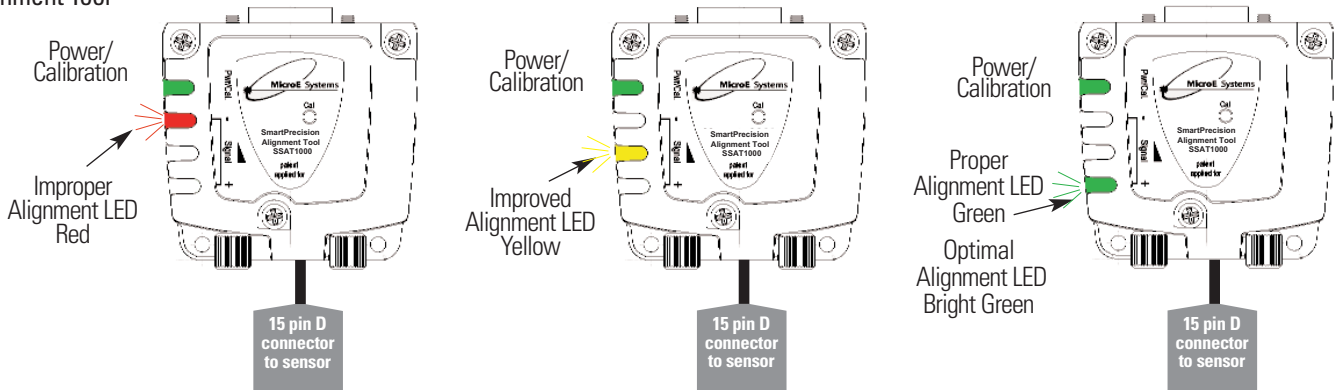
The red, yellow, or green LED will light depending on sensor alignment. Slowly move the sensor by allowing it to slide on the mounting surface until the green LED, is illuminated. Optimal alignment will be displayed as a "Bright Green" LED.

IMPORTANT: Confirm that the green LED blinks when passing over the index. If not, readjust the sensor in the Y direction and repeat the above procedure. When alignment is completed, tighten the sensor mounting screws.



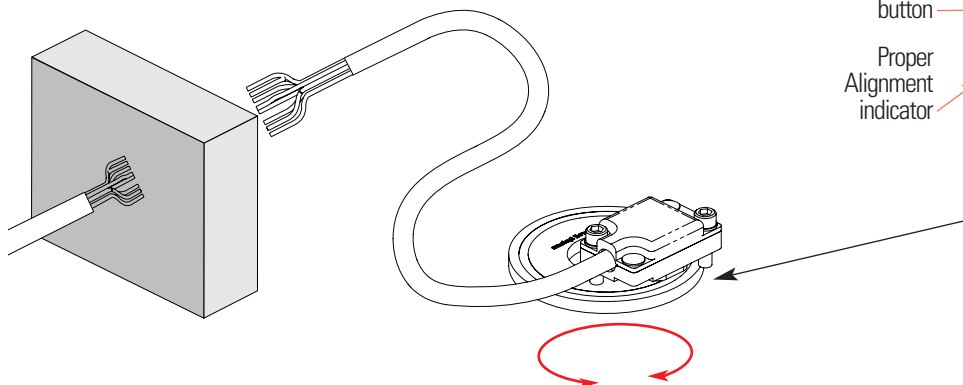
To align the sensor, move it in the Y or θ_z directions.

SmartPrecision Alignment Tool



6

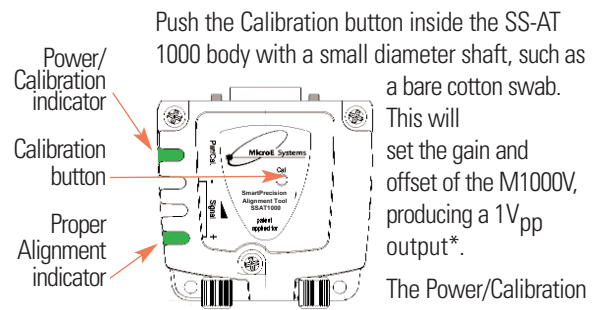
Confirm green over the full range of motion by sliding the scale past the sensor. The "green" LED must remain on over the entire range. If not aligned over the entire range of motion, loosen the sensor mounting screws and repeat step 5.



7

IMPORTANT OUTPUT CALIBRATION PROCEDURE

This procedure must be completed for proper system operation each time the sensor is aligned.



Push the Calibration button inside the SS-AT 1000 body with a small diameter shaft, such as a bare cotton swab.

This will set the gain and offset of the M1000V, producing a 1V_{pp} output*.

The Power/Calibration indicator will flash continuously. Move the scale past the sensor over a distance of at least 7mm (1/4"). Do not run off the end of the scale when using a segment scale. When the calibration procedure is complete, the Power/Calibration LED stops flashing.

* ±15% (Differential) across 120Ω resistor

Reference Section

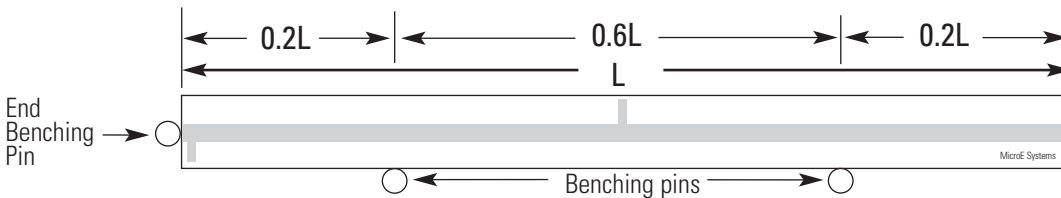
Installation of Linear Scales

Positioning the Scale

Note: Before beginning mounting procedure, use talc-free gloves or finger cots to handle the scales. Also use vacuum compatible handling procedures and materials. "Benching" the scale to the system means aligning the scale by means of benching pins. Pin locations are described on the appropriate interface drawing. Two benching pins are recommended on the long side of the scale and one at the end as shown. This is marked datum A on the interface drawing.

1 Position the benching pins in from either end. 20% of the overall scale length is the recommended location from the edge.

2 Be sure the benching pins do not extend too high in the Z direction to prevent mechanical interference with the sensor or sensor mount.

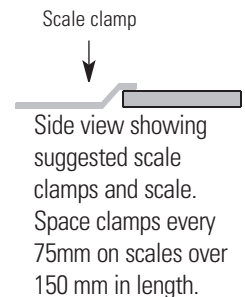
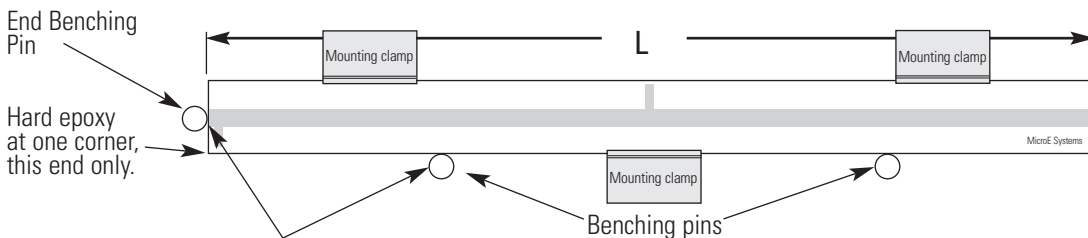


Mounting the Scale

Suggested Epoxy and Clamp Mounting

1 Make sure the mounting surface is clean and dry.

3 Scale clamps (customer supplied) may be used to mechanically secure the scale. The clamps should allow for thermal expansion of the scale and mounting surface. Make sure that the clamps do not interfere with the sensor or sensor mount. Note: adhesive used on clamps supplied by MicroE is not vacuum rated.



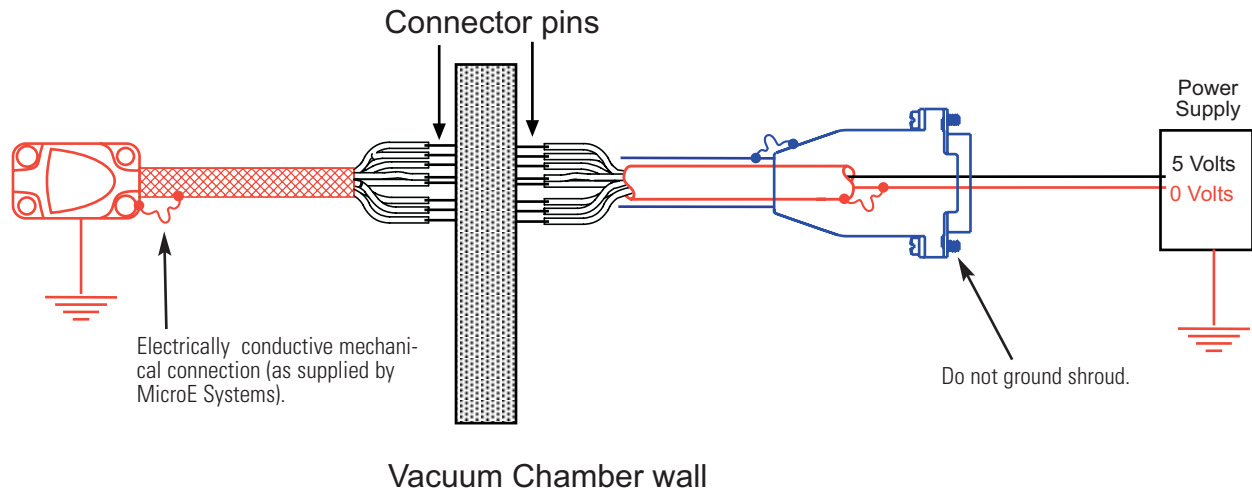
2 Align the scale by placing the edges against the benching pins.

4 Apply a hard, vacuum compatible epoxy to the end of the scale at the end benching pin.

Grounding Instructions for Mercury 1000V Encoder Systems

Correct grounding can be implemented in several ways depending on how the customer implements the connections through the vacuum chamber wall. The diagram below is suitable where:

- The outer cable shields are electrically isolated from each other at the vacuum chamber wall.
- The sensor is mounted with good electrical contact to a well-grounded surface. (Note that an electrical path through bearings will not result in a well-grounded sensor.)



Note: specific applications may require a different grounding scheme. Contact MicroE Systems for applications support.

Shielding Instructions

Customer-installed connectors at the vacuum chamber wall must electrically shield the signal wires from Electro Magnetic Interference, Radio Frequency Interference and Electro Static Discharge. The connectors' shielding must completely surround the wires with no gaps, including intimate electrical contact 360 degrees around the outer cable shields at the ends of the cables supplied with flying leads. The inner shield of the cable that is attached to the SmartPrecision electronics module must be electrically isolated from the outer shield.

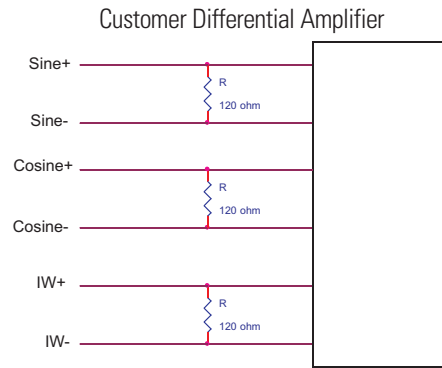
Important Note

MicroE Systems recommends testing the motion subsystem after the Mercury 1000V encoders are installed using your vacuum through-wall connectors. The testing should prove that the motion system has sufficient immunity to Electro Magnetic Interference, Radio Frequency Interference and Electro Static Discharge according to the application requirements.

Recommendations for Power

Mercury encoders require a minimum of 4.75V DC continuously. When designing circuits and extension cables to use Mercury encoders, be sure to account for voltage loss over distance and tolerances from the nominal supply voltage so that at least 4.75V DC is available to the Mercury encoder under all operating conditions. The input voltage should not exceed 5.25V DC.

Recommended Interface Termination



Customer Interface Cable Requirements

Customer cables that interface to Mercury series encoders must have the following characteristics:

- Twisted pair signal wiring.
- Characteristic impedance of 100-120 ohms.
- Sufficient wire gauge to meet the minimum voltage requirement at the encoder, for example 24AWG gauge wire for a 2m length cable. An example of acceptable cables with 24 AWG gauge wire and 4 twisted pairs are Belden 9831, 8104, 8334 and 9844 or other manufacturer's equivalents.
- Single shield cable with a minimum of 90% coverage. Note that a double shielded cable may be required in high-noise applications.

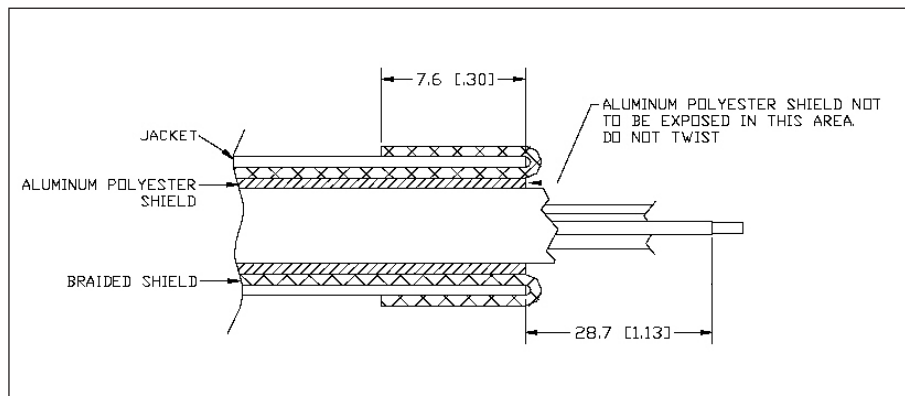
Signal Wiring:

Each differential signal should be connected to a corresponding twisted pair as follows:

Mercury 1000V Encoders	
Signal	Twisted Pair
Sine+	Pair 1
Sine-	
Cosine+	Pair 2
Cosine-	
Index+	Pair 3
Index-	
+5V	Pair 4
GND	

Shield Termination:

The customer's cable shield should be in 360° contact with the connector shroud and the connector shell to provide complete shielding. The connector shell should be metal with conductive surfaces. Suggested metal connector shells for use with Mercury 3500, 3000, 3000Si, and 2000 encoders: AMP 748676-1 or equivalent; for Mercury 1000 and 1500S encoders: AMP 745172-3, -2, or -1 where the dash number is dependent on the customer's outside cable diameter. The shield should be terminated as illustrated in the following diagram.



Fold braided shield back over jacket. Example shows double-shielded cable. Dimensions shown are for illustration only.

Troubleshooting

Problem

The Power/Calibration indicator will not come on.

Solution

- Make sure the M1000 15-pin D connector is fully seated and connected.
- Confirm that +5 Volts DC is being applied to pin 12 on the M1000 15-pin D connector and that pin 13 is connected to ground.

Problem

Can't get the SmartPrecision Alignment Tool "Signal" LEDs better than red or yellow; or the green, "green" indicator doesn't stay illuminated over the full length of the scale.

Solution

- Verify that the sensor has been aligned to the scale and that the mounting screws are tight. Check the dimensions for the mechanical mounting holes (and clamps if any) to make sure that the sensor is correctly located over the scale. Refer to appropriate the interface drawing.
- Check that the scale is firmly mounted and can't jiggle or move in other than the intended direction.
- Make sure that the scale is clean over its entire length or circumference.

Problem

The green Power/Calibration indicator is flashing unexpectedly.

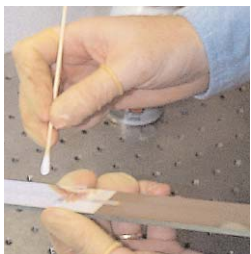
Solution

- Part of the normal setup procedure is to activate the SmartPrecision Alignment Tool calibration process by pressing the recessed button on the SmartPrecision Alignment Tool connector body. The Power/Calibration indicator will flash until calibration is complete.



General Particle Removal

Blow off the contamination with nitrogen, clean air, or a similar gas.

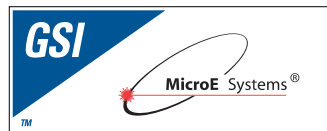


Contamination Removal

Use a lint-free cleanroom wipe or cotton swab dampened with isopropyl alcohol or acetone only to wipe the surface clean. Handle the scale by the edges. Do not scrub the scale.

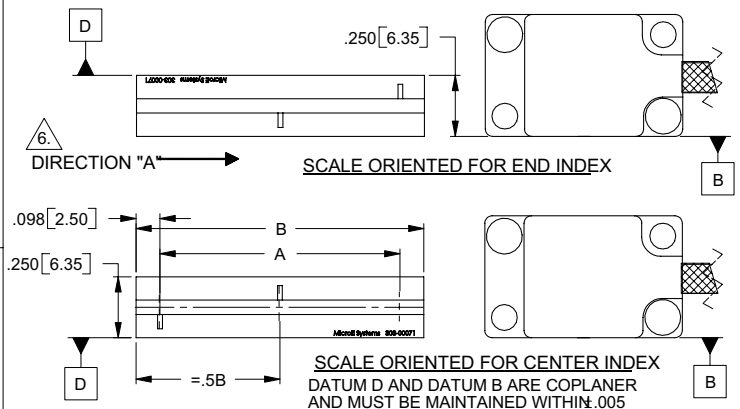
Contacting MicroE Systems

Thank you for purchasing a MicroE Systems product. You should expect the highest level of quality and support from MicroE. If you want to download the Mercury Encoder Installation Manual, Data Sheet or Interface Drawing, browse www.microesys.com and click on the Mercury Encoders button.

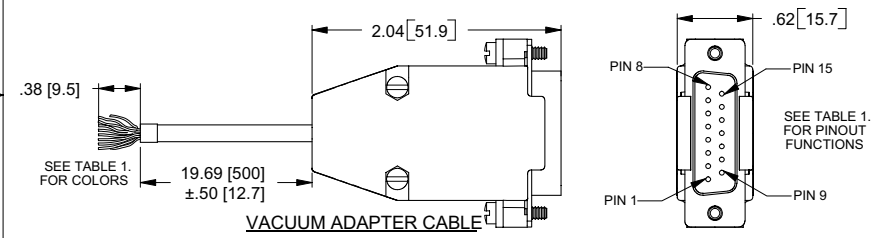


Mercury 1000V Encoder System Interface Drawing: Short Linear Scales

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SCALES SHOWN IN THESE VIEWS TRANSLATED IN X AXIS OUT OF OPERATING RANGE FOR CLARITY



- NOTES:**
1. RECOMMENDED MOUNTING HARDWARE:
2-56 OR M2 SCREWS w/ 4 FLAT WASHERS (2 ON EACH SCREW)
(OD OF WASHER NOT TO EXCEED .150 [3.81])
 2. IF BENCHING PINS ARE TO BE USED, PINS MUST BE PLACED ALONG DATUM EDGES OF BOTH THE SENSOR AND THE SCALE FOR PROPER ALIGNMENT. (REFERENCE DATUMS B1, B2 AND C1 FOR SENSOR BENCHING PINS).
 3. HEIGHT OF SENSOR BENCHING PINS MUST BE A MINIMUM OF .170 [4.32] IN HEIGHT FROM DATUM A.
 4. HEIGHT OF SCALE BENCHING PINS NOT TO EXCEED THE THICKNESS OF THE SCALE.
 5. RECOMMENDED SENSOR MOUNTING PLATE THICKNESS:
MINIMUM- 4 SCREW THREADS
MAXIMUM- ALLOW CLEARANCE FOR SCALE AND SCALE MOUNTING HARDWARE (BENCHING SURFACES, CLAMPS, HUBS, ETC.)

6. WHEN SCALE MOVES IN DIRECTION "A" WITH RESPECT TO A STATIONARY READHEAD, OUTPUT SIGNAL COS+ (BROWN [PIN 7]) LEADS OUTPUT SIGNAL SIN+ (YELLOW [PIN 8]).
7. DO NOT CONNECT TO "RESERVED" PINS. SEE TABLE 1 FOR RESERVED PINS

SCALE IDENTIFICATION AND SIZE.

Scale	Dim A.	Dim B.
Identification #	Measured Length	Scale Length
LXX	XXmm-5mm	XXmm
L30	30mm-5mm = 25mm	30mm
(max) L130	130mm-5mm = 125mm	130mm

THESE ARE EXAMPLES

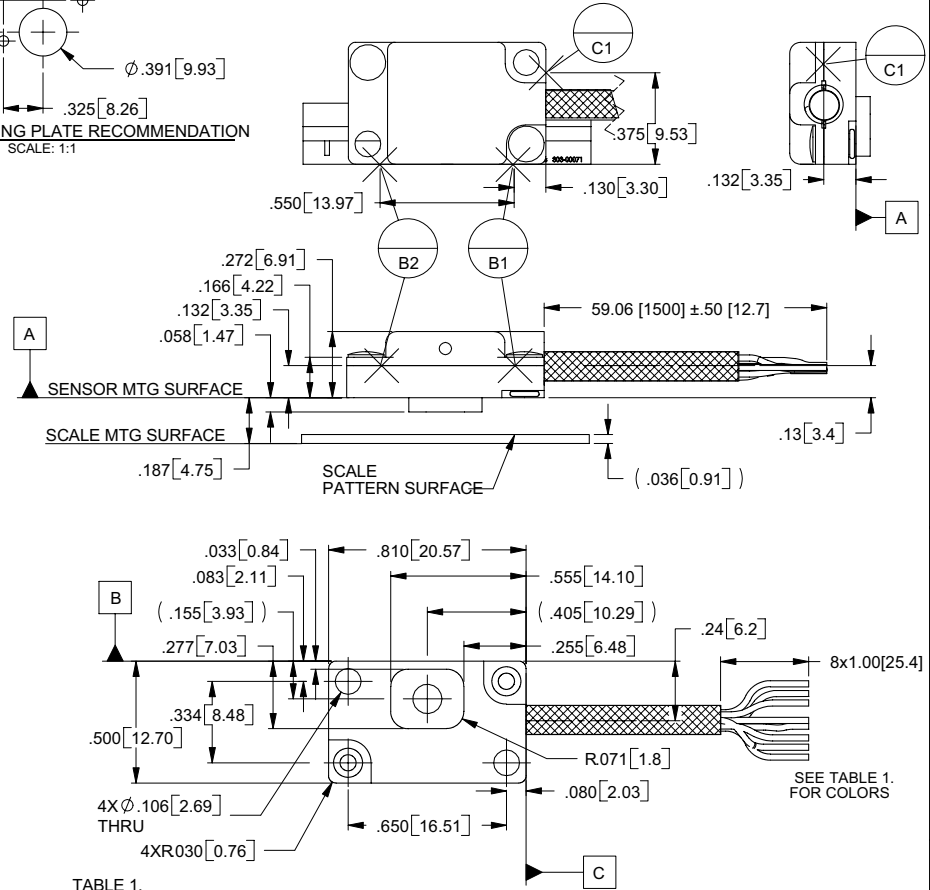
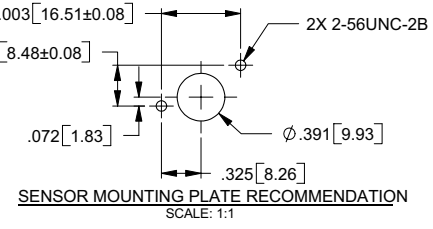


TABLE 1.

Wire Color	Function	Pin
Blue	INDEX WINDOW -	1
Violet	INDEX WINDOW +	2
	RESERVED	3
	RESERVED	4
	RESERVED	5
	RESERVED	6
Brown	COS+	7
Yellow	SIN+	8
Gray	N/C	9
White	N/C	10
	N/C	11
Red	+5V	12
Black	GND	13
Orange	COS-	14
Green	SIN-	15

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES (millimeters)
DIM. APPLY AFTER PROCESSING
INTERPRET ALL GEOMETRIC TOLS.
PER ANSI Y14.5M-1994

TOLERANCES ARE:
DECIMALS: .XX [X1.01 [25]
.XXX [XX.005 [13]
ANGULAR: ±30 MIN.

REVISIONS				
LTR	ECO	DESCRIPTION	DATE	APPO
A		RELEASE TO PRODUCTION	7/8/02	MF
B	960	SNOUT DIMS REF. SCALE THK WAS .037 REF.	9/24/02	MF
C	1428	UPDATED MODEL WITH SHRUNKEN HYBRID, ADDED NOTE 8.	5/25/05	SB
D	1492	REMOVED NOTE 8.	10/5/05	SB

UNITS: .in [mm]

APPROVALS	DATE
DRAWN S.BUTURLIA	6/25/02
CHECKED	
ENGRG D.GRIMES	7/2/02
MFG ENG C.ANGELOPOULOS	7/3/02
QA J.FARNAM	7/3/02

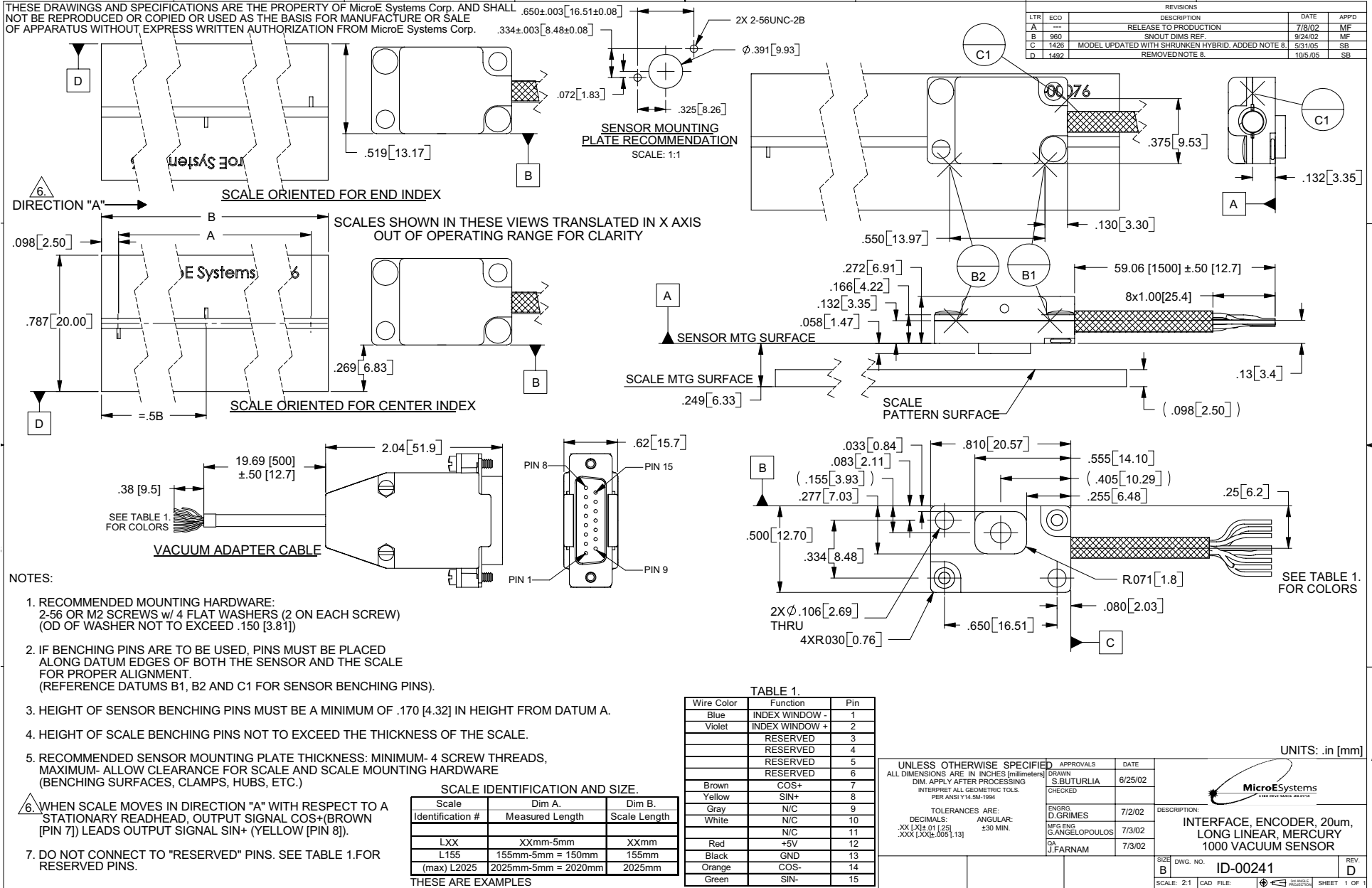
MicroE Systems
INTERFACE, ENCODER, 20um,
SHORT LINEAR, MERCURY
1000 VACUUM SENSOR

SIZE B	DWG. NO. ID-00240	REV. D
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SCALE: 2:1 CAD FILE: SHEET 1 OF 1

Mercury 1000V Encoder System Interface Drawing: Long Linear Scales

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NOTES:

1. RECOMMENDED MOUNTING HARDWARE:
2-56 OR M2 SCREWS w/ 4 FLAT WASHERS (2 ON EACH SCREW)
(OD OF WASHER NOT TO EXCEED .150 [3.81])
2. IF BENCHING PINS ARE TO BE USED, PINS MUST BE PLACED
ALONG DATUM EDGES OF BOTH THE SENSOR AND THE SCALE
FOR PROPER ALIGNMENT.
(REFERENCE DATUMS B1, B2 AND C1 FOR SENSOR BENCHING PINS).
3. HEIGHT OF SENSOR BENCHING PINS MUST BE A MINIMUM OF .170 [4.32] IN HEIGHT FROM DATUM A.
4. HEIGHT OF SCALE BENCHING PINS NOT TO EXCEED THE THICKNESS OF THE SCALE.
5. RECOMMENDED SENSOR MOUNTING PLATE THICKNESS: MINIMUM- 4 SCREW THREADS,
MAXIMUM- ALLOW CLEARANCE FOR SCALE AND SCALE MOUNTING HARDWARE
(BENCHING SURFACES, CLAMPS, HUBS, ETC.)

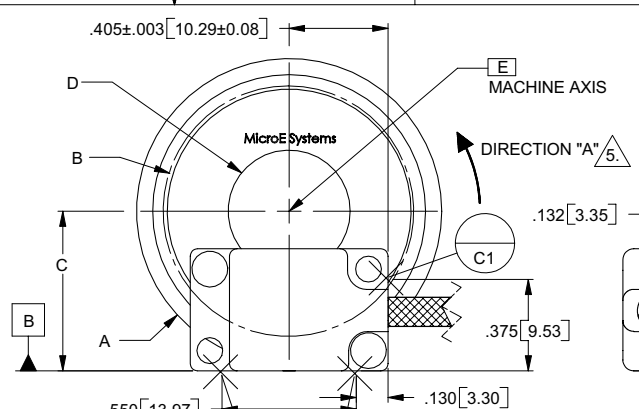
6. WHEN SCALE MOVES IN DIRECTION "A" WITH RESPECT TO A
STATIONARY READHEAD, OUTPUT SIGNAL COS+(BROWN
[PIN 7]) LEADS OUTPUT SIGNAL SIN+(YELLOW [PIN 8]).
7. DO NOT CONNECT TO "RESERVED" PINS. SEE TABLE 1.FOR
RESERVED PINS.

Mercury 1000V Encoder System Interface Drawing: Rotary Scale with Hub

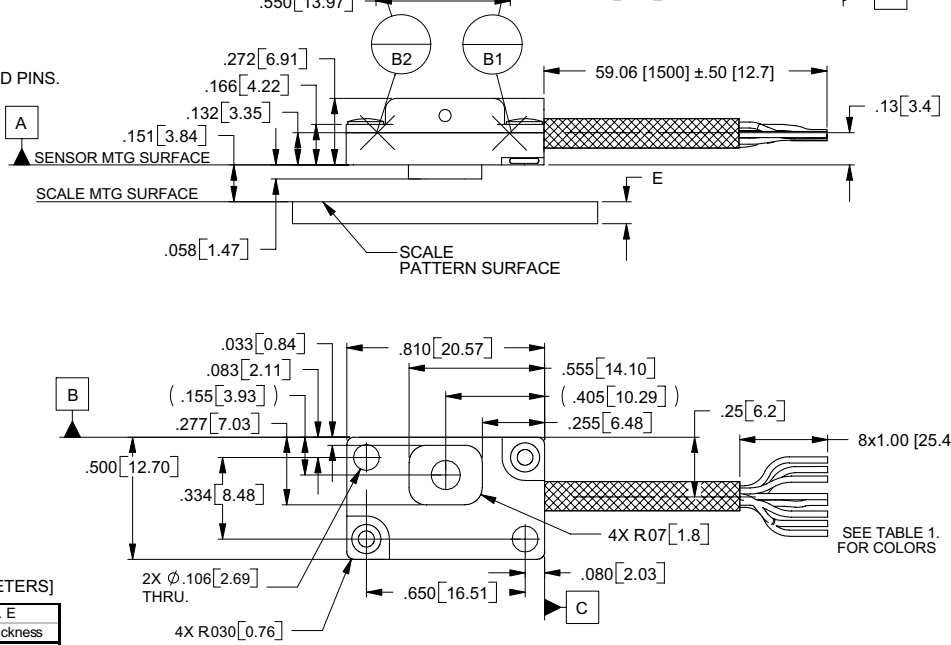
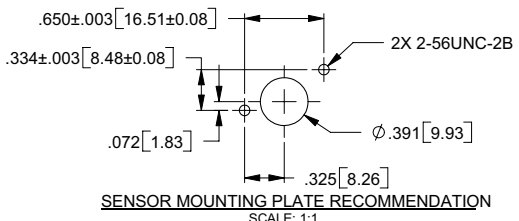
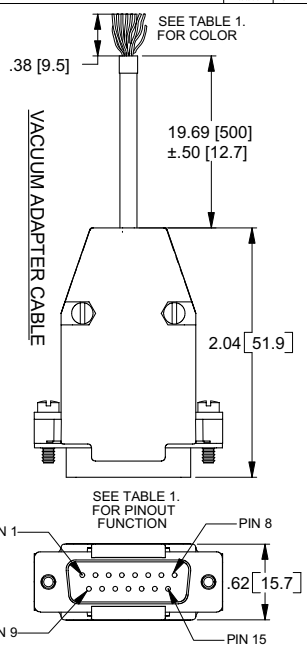
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NOTES:

- RECOMMENDED MOUNTING HARDWARE:
2-56 OR M2 SCREWS w/ 4 FLAT WASHERS (2 ON EACH SCREW)
(OD OF WASHER NOT TO EXCEED .150 [3.81])
 - IF BENCHING PINS ARE TO BE USED, PINS MUST BE PLACED ALONG DATUM EDGES OF SENSOR FOR PROPER ALIGNMENT. (REFERENCE DATUMS B1, B2 AND C1).
 - HEIGHT OF SENSOR BENCHING PINS MUST BE A MINIMUM OF .170 [4.32] IN HEIGHT FROM DATUM A.
 - RECOMMENDED SENSOR MOUNTING PLATE THICKNESS:
MINIMUM- 4 SCREW THREADS
MAXIMUM- ALLOW CLEARANCE FOR SCALE AND SCALE MOUNTING HARDWARE (BENCHING SURFACES, CLAMPS, HUBS, ETC.)
5. WHEN SCALE MOVES IN DIRECTION "A" WITH RESPECT TO A STATIONARY READHEAD, OUTPUT SIGNAL COS+ (BROWN [PIN 7]) LEADS OUTPUT SIGNAL SIN+ (YELLOW [PIN 8]).
6. DO NOT CONNECT TO "RESERVED" PINS. SEE TABLE 1. FOR RESERVED PINS.



REVISIONS				
LTR	ECO	DESCRIPTION	DATE	APPD
A	---	RELEASE TO PRODUCTION	7/8/02	MF
B	954	CORRECTED DIMS IN TABLE (Dim D), mm CONVERSION INCORRECT	8/29/02	MF
C	960	SNOUT DIMS REF. ADDED R1206 TO TABLE	9/24/02	MF
D	1126	Updated Scale Table, Added Hub I.D., Hub Height. See ECO	8/26/03	MF
E	1199	SCALE THICKNESS TOLERANCE WAS +.008 (.000"). SEE ECO	3/9/04	MF
F	1492	REMOVED HUB AND UPDATED TABLE	10/05/05	SB



Wire Color	Function	Pin
Blue	INDEX WINDOW -	1
Violet	INDEX WINDOW +	2
	RESERVED	3
	RESERVED	4
	RESERVED	5
	RESERVED	6
Brown	COS+	7
Yellow	SIN+	8
Gray	N/C	9
White	N/C	10
	N/C	11
Red	+5V	12
Black	GND	13
Orange	COS-	14
Green	SIN-	15

SCALE SIZE AND MOUNTING OPTIONS. DIMENSIONS IN INCHES [MILLIMETERS]

Scale	Counts/Rev	Dim. A	Dim. D	Dim. B	Dim. C	Dim. E
Identification	Rev	Scale O.D.	Scale I.D.	Optical Dia.	Mounting Dim.	Scale Thickness
R1206	1,650	0.472 [12.00]	.250+/--.005 [6.35+/--.13]	0.413 [10.50]	0.348+/--.002 [8.84+/--.05]	.036+/--.002 [.91+/--.05]
R1910	2,500	0.750 [19.05]	.375+/--.005 [9.53+/--.13]	0.627 [15.92]	0.454+/--.002 [11.53+/--.05]	.090+/--.004 [2.29+/--.10]
R3213	4,096	1.250 [31.75]	.500+/--.005 [12.70+/--.13]	1.027 [26.08]	0.654+/--.002 [16.62+/--.05]	.090+/--.004 [2.29+/--.10]
R5725	8,192	2.250 [57.15]	1.000+/--.005 [25.40+/--.13]	2.053 [52.15]	1.168+/--.002 [29.66+/--.05]	.090+/--.004 [2.29+/--.10]
R10851	16,384	4.250 [107.95]	2.000+/--.005 [50.80+/--.13]	4.106 [104.30]	2.194+/--.002 [55.73+/--.05]	.090+/--.004 [2.29+/--.10]

UNLESS OTHERWISE SPECIFIED, PROVALS
ALL DIMENSIONS ARE IN INCHES (MILLIMETERS)
DIM. APPLY AFTER PROCESSING
INTERPRET ALL GEOMETRIC TOLS. PER ANSI Y 14.5M-1994

TOLERANCES ARE:
DECIMALS: XX [X±.01 [25] ±50 MIN.
XXX [XX±.005 [13]

APPROVALS
DRAWN: S.BUTURLIA
CHECKED: []
ENGR: D.GRIMES
MFG ENG: G.ANGELOPOULOS
QA: J.FARNAM

DATE
6/25/02
7/2/02
7/3/02
7/3/02

MicroE Systems
A MICROE SYSTEMS COMPANY

DESCRIPTION:
INTERFACE, ENCODER, 20um,
ROTARY w/HUB, MERCURY
1000 VACUUM SENSOR

SIZE: B
DWG. NO.: ID-00242
SCALE: 2:1
CAD FILE: []

REV. F
SHEET 1 OF 1

UNITS: .in [mm]