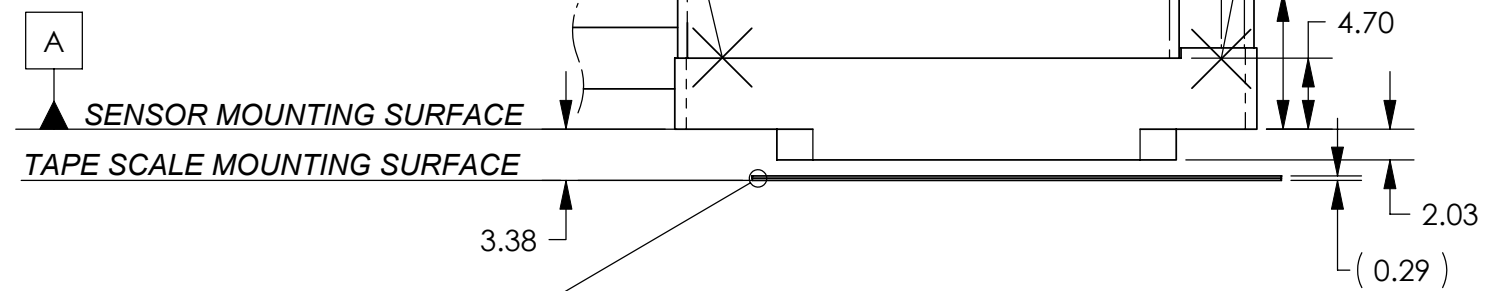
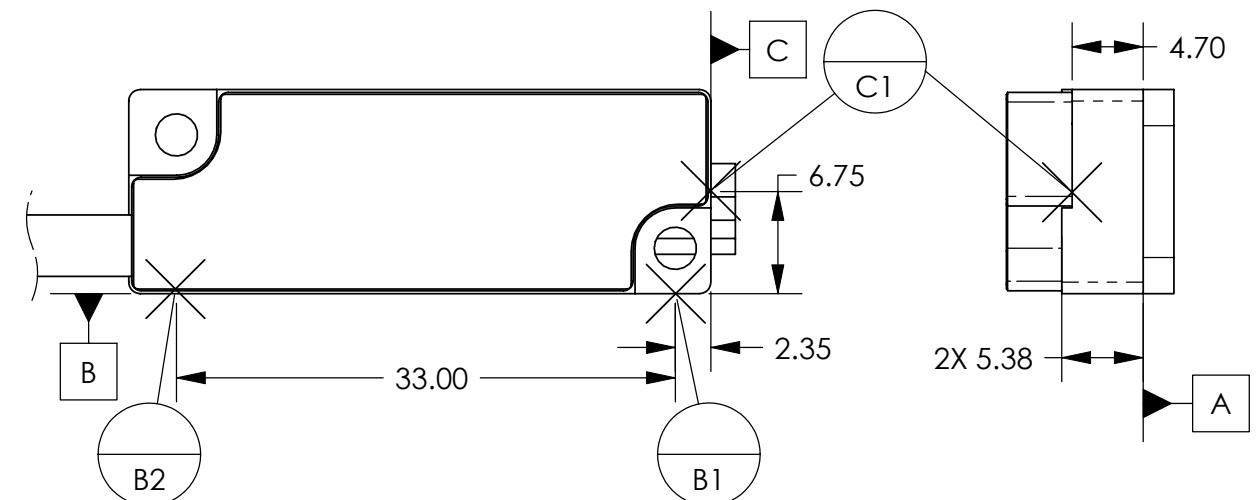
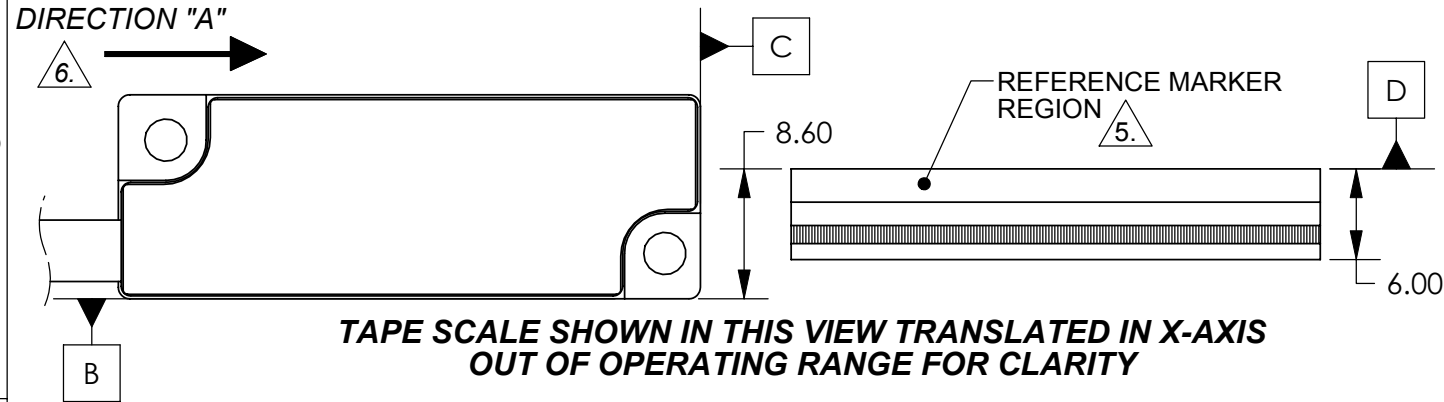
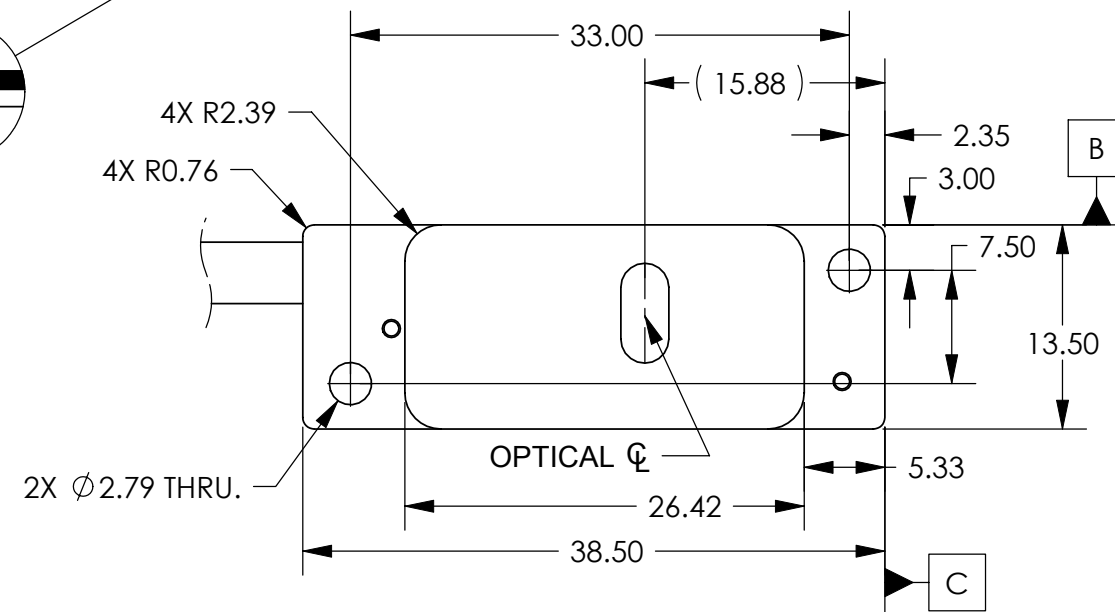


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LTR	ECO	DESCRIPTION	DATE	APPROVED
1	---	INITIAL	7/28/08	VB



METAL TAPE SCALE
ADHESIVE BACKING
(TAPE SCALE MOUNTING SURFACE)



- NOTES:
1. RECOMMENDED MOUNTING HARDWARE:
2-56 or M2.5 SCREWS
 2. 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).
 3. HEIGHT OF SENSOR BENCHING PINS MUST NOT EXCEED HEIGHT OF SENSOR BODY (4.70mm).
 4. RECOMMENDED SENSOR MOUNTING PLATE THICKNESS:
MINIMUM: 4 SCREW THREADS
MAXIMUM: ALLOW FOR CLEARANCE TO SCALE AND SCALE MOUNTING HARDWARE (BENCHING SURFACES, TRENCHES, ETC.)

5. SEE PAGE 3 FOR DIMENSIONS FOR LOCATIONS OF REFERENCE MARKERS.
6. WHEN SCALE MOVES IN DIRECTION "A" WITH RESPECT TO A STATIONARY SENSOR, OUTPUT SIGNAL A+ (PIN 14) LEADS OUTPUT SIGNAL B+ (PIN 13). THIS APPLIES TO QUADRATURE SENSOR ONLY.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS DIM. APPLY AFTER PROCESSING INTERPRET ALL GEOMETRIC TOLS. PER ANSI Y14.5M-1994 TOLERANCES ARE: DECIMALS: .X ± .25 .XX ± .13 ANGULAR: ±30 MIN.	APPROVALS	DATE	 MicroE Systems Division of GSI 8 Erie Drive Natick, MA 01760
	DRAWN S.BUTURLIA	7/10/08	
	CHECKED A.GOLDMAN	7/23/08	
	ENGRG.		
	MFG ENG		DESCRIPTION: INTERFACE, ENCODER, 20um, TAPE SCALE w/INDEX AND REFERENCE MARKERS, MERCURY II 5000 SENSOR
	QA		SIZE DWG. NO. REV. B ID-00353 1
	SCALE:	CAD FILE:	3rd ANGLE PROJECTION SHEET 1 OF 4

UNITS: mm

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Division of GSI

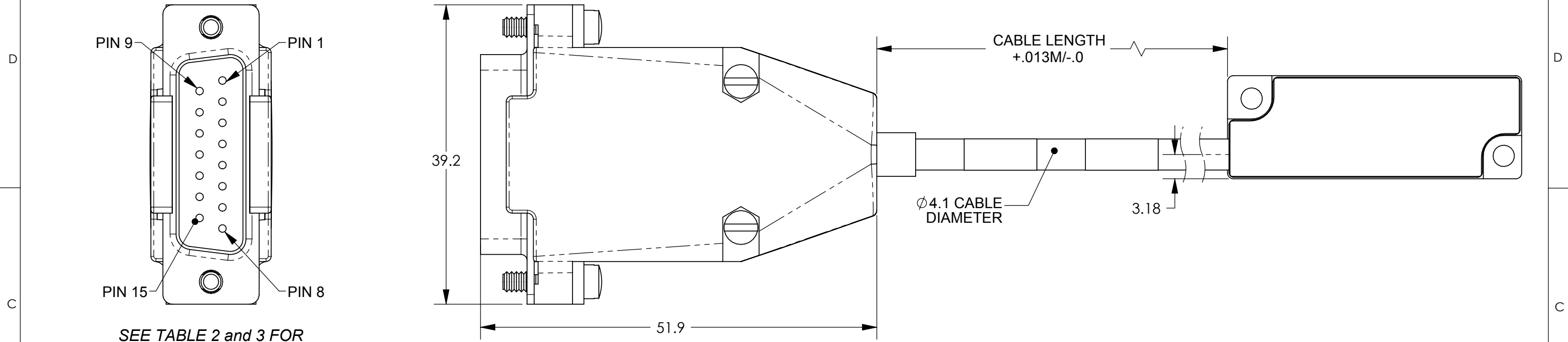
8 Erie Drive
Natick, MA 01760

DESCRIPTION:
INTERFACE, ENCODER, 20um,
TAPE SCALE w/INDEX AND
REFERENCE MARKERS,
MERCURY II 5000 SENSOR

SIZE DWG. NO. REV.
B ID-00353 1

SCALE: CAD FILE: 3rd ANGLE PROJECTION SHEET 1 OF 4

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SEE TABLE 2 and 3 FOR PIN FUNCTIONS

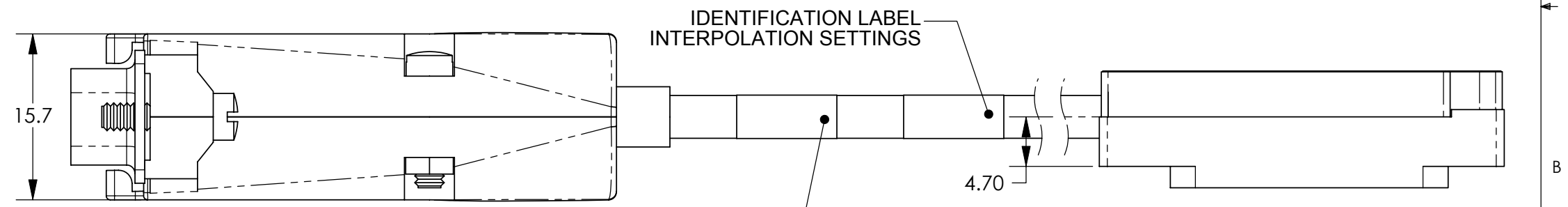


TABLE 2.

Mercury II 5000 15-Plug Quadrature Output	
Pin	Function
1	RL+
2	GND
3	RL-
4	I-
5	B-
6	A-
7	5V
8	5V
9	GND
10	LL+
11	LL-
12	I+
13	B+
14	A+
15	Inner Shield

TABLE 3.

Mercury II 5000 15-Plug Serial Output	
Pin	Function
1	nCS+
2	GND
3	nCS-
4	DIAG_IN_OUT-
5	SCLOCK_OUT-
6	SDATA_OUT-
7	5V
8	5V
9	GND
10	SCLOCK_IN+
11	SCLOCK_IN-
12	DIAG_IN_OUT+
13	SCLOCK_OUT+
14	SDATA_OUT+
15	Inner Shield

IDENTIFICATION LABEL SENSOR P/N, SERIAL#

Cable Lengths	
1M	
5M	
Custom	

UNITS: mm

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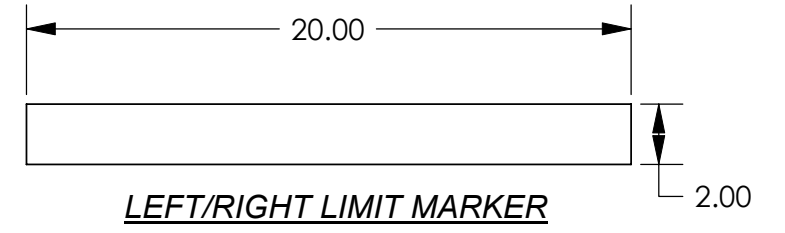
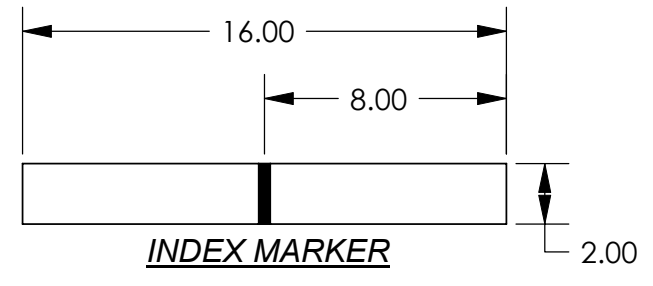
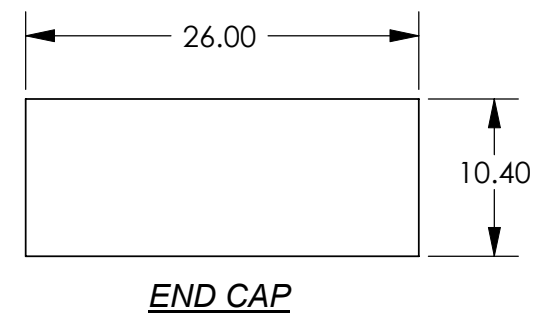
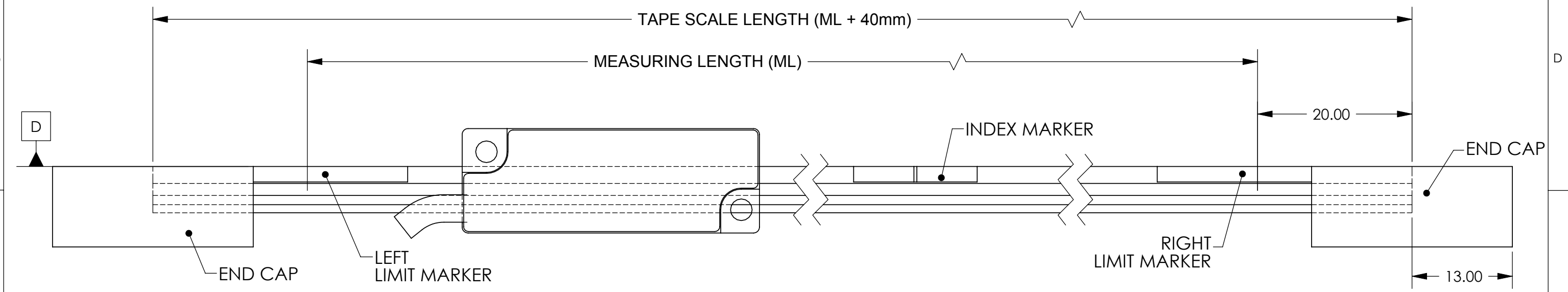
8 Erie Drive
Natick, MA 01760

DESCRIPTION: INTERFACE, ENCODER, 20um, TAPE SCALE w/INDEX AND REFERENCE MARKERS, MERCURY II 5000 SENSOR

SIZE B	DWG. NO. ID-00353	REV. 1
SCALE:	CAD FILE:	3RD ANGLE PROJECTION SHEET 2 OF 4

8 7 6 5 4 3 2 1

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- NOTES:
- BEFORE PLACING INDEX MARKERS, LIMIT MARKERS, AND END CAPS, REMOVE BLUE PROTECTIVE FILM FROM TAPE SCALE.
 - NOTE DATUM EDGE OF TAPE SCALE AND REFERENCE MARKER REGION BEFORE APPLYING MARKERS.
 - END CAPS, LIMITS AND INDEX MARKERS ARE OPTIONAL (SEE INSTALLATION MANUAL).
 - LIMIT MARKERS CAN BE PLACED AT ENDS OF TAPE SCALE WHEN END CAPS ARE NOT USED.
 - END CAPS, LIMITS AND INDEX MARKERS SHALL NOT OVERLAP (MAY CAUSE INTERFERENCE WITH SENSOR).
 - FOR LONGER OR SHORTER LENGTHS OF MARKERS CALL MICROE SYSTEMS FOR DETAILS.

UNITS: mm

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DESCRIPTION: INTERFACE, ENCODER, 20um,
 TAPE SCALE w/INDEX AND
 REFERENCE MARKERS,
 MERCURY II 5000 SENSOR

SIZE	DWG. NO.	REV.
B	ID-00353	1

SCALE: CAD FILE: 3RD ANGLE PROJECTION SHEET 3 OF 4

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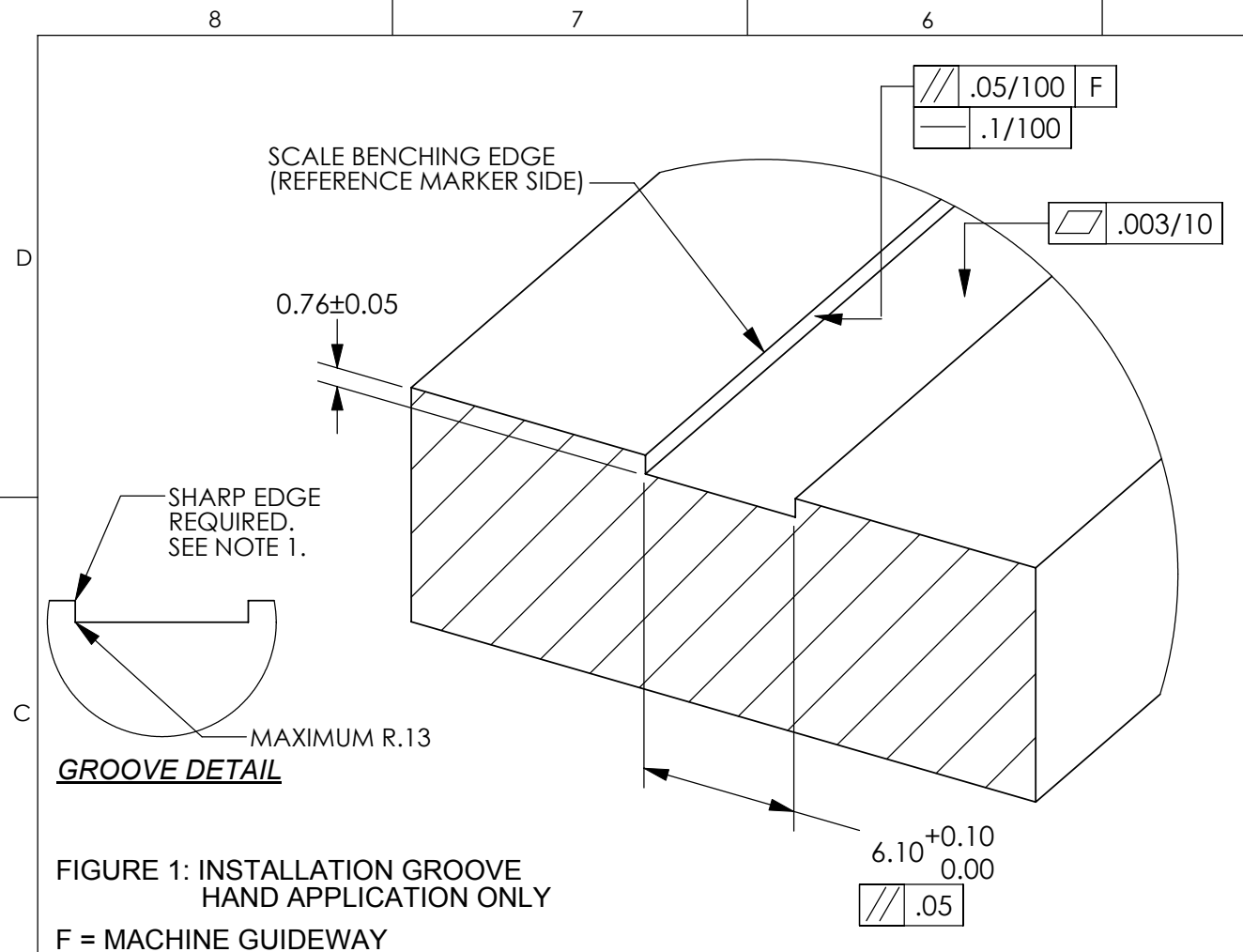


FIGURE 1: INSTALLATION GROOVE
HAND APPLICATION ONLY
F = MACHINE GUIDEWAY

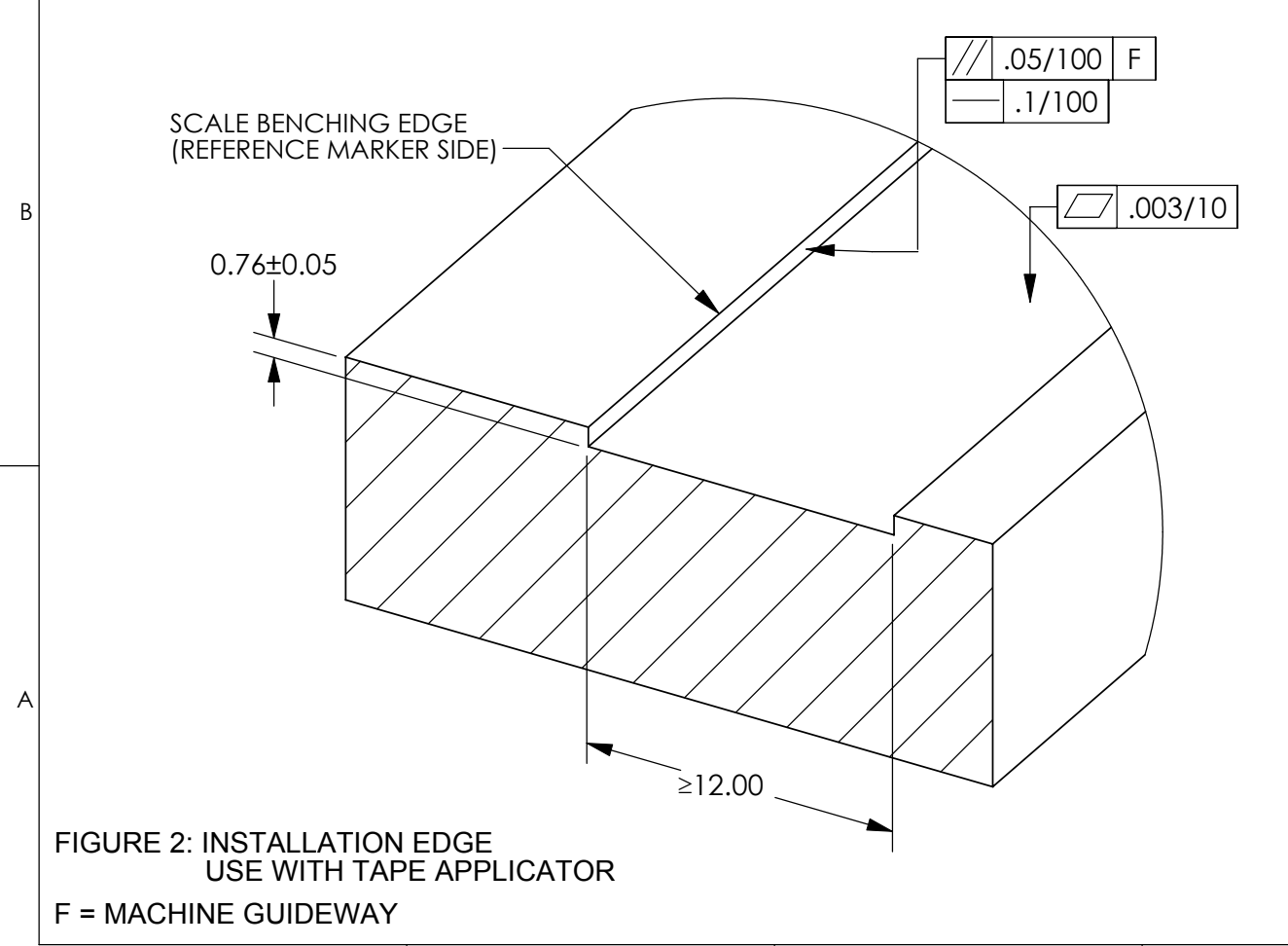


FIGURE 2: INSTALLATION EDGE
USE WITH TAPE APPLICATOR
F = MACHINE GUIDEWAY

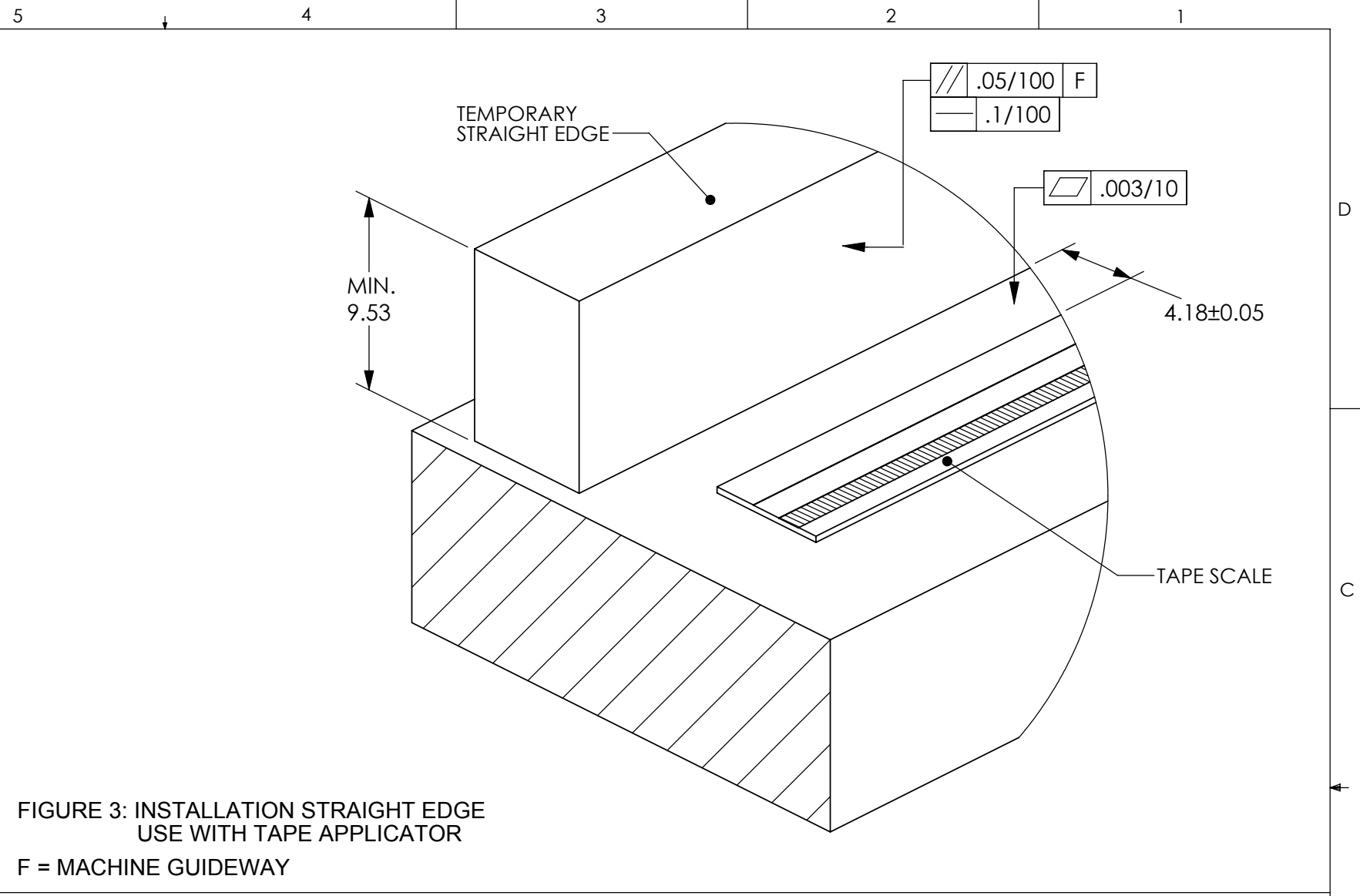


FIGURE 3: INSTALLATION STRAIGHT EDGE
USE WITH TAPE APPLICATOR
F = MACHINE GUIDEWAY

- NOTES:
1. MICROE SYSTEMS RECOMMENDS UTILIZING AN EDGE AS A GUIDE IN ORDER TO MAINTAIN STRAIGHTNESS OF THE SCALE DURING MOUNTING. THIS EDGE MAY BE TEMPORARY OR PERMANENT AND SHOULD FOLLOW THE APPLICATION GUIDELINES IN FIGURES 1-3.
 2. THE TAPE SCALE APPLICATOR TOOL IS RECOMMENDED FOR INSTALLATION OF SCALES AND, IN PARTICULAR, THOSE LONGER THAN 250 MILLIMETERS. SHORTER SCALES MAY BE APPLIED EITHER BY HAND OR WITH APPLICATOR TOOL. PLEASE SEE INSTRUCTION MANUAL FOR DETAILS.
 3. THE INSTALLATION METHOD SHOWN IN FIGURE 1 SHOULD INVOLVE HAND INSTALLATIONS ONLY. THE APPLICATOR TOOL IS NOT COMPATIBLE WITH THIS METHOD. IN ADDITION END CAPS CANNOT BE USED WITH THIS METHOD.
 4. FOR APPLICATIONS WHERE MACHINING THE MOUNTING SURFACE IS NOT DESIRED, A TEMPORARY STRAIGHTEDGE CAN BE USED. A STAINLESS STEEL RULE MAY BE USED AS IN FIGURE 2 IF THE RULE MEETS THE THICKNESS REQUIREMENT. OTHERWISE, THE TEMPORARY STRAIGHTEDGE MAY BE USED AS SHOWN IN FIGURE 3.
 5. IN FIGURE 3, THE OUTSIDE REFERENCE SURFACE OF THE TOOL SLIDES AGAINST THE TEMPORARY STRAIGHT EDGE, AND THE TAPE SCALE IS THEREFORE OFFSET FROM THE EDGE AS SHOWN. IF THIS OFFSET IS TOO SMALL FOR THE APPLICATION, THE CUSTOMER MAY DESIRE TO CREATE A SPACER THAT CAN ATTACH TO THE OUTSIDE SURFACE OF THE TOOL. PLEASE SEE INSTRUCTION MANUAL FOR DETAILS.
 6. IN FIGURES 1 AND 2, THE SCALE BENCHING EDGE IS INTENDED TO AID THE INSTALLATION OF REFERENCE MARKERS. FOR APPLICATIONS SUCH AS IN FIGURE 3, THE CUSTOMER MAY USE A TEMPORARY BENCHING SURFACE TO INSURE THE PROPER INSTALLATION OF THE REFERENCE MARKERS. PLEASE SEE INSTRUCTION MANUAL FOR DETAILS. THE EDGE OF THE GROOVE OR STRAIGHTEDGE MUST BE SHARP ON BENCHING SIDE IN ORDER FOR APPLICATOR TO USE AS A GUIDE. IN ORDER FOR THE TAPE SCALE TO MOUNT CLOSE TO THIS EDGE, A MAXIMUM RADIUS OF .13 SHOULD BE USED WHERE THE EDGE MEETS THE BOTTOM OF THE MOUNTING SURFACE.

UNITS: mm

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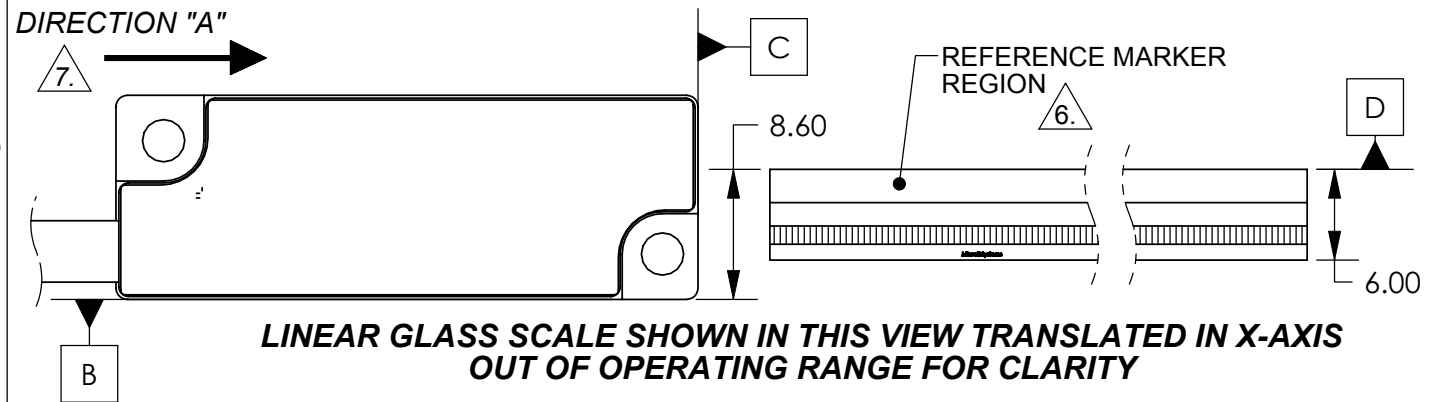
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TAPE SCALE w/INDEX AND
REFERENCE MARKERS,
MERCURY II 5000 SENSOR

SIZE	DWG. NO.	REV.
B	ID-00353	1

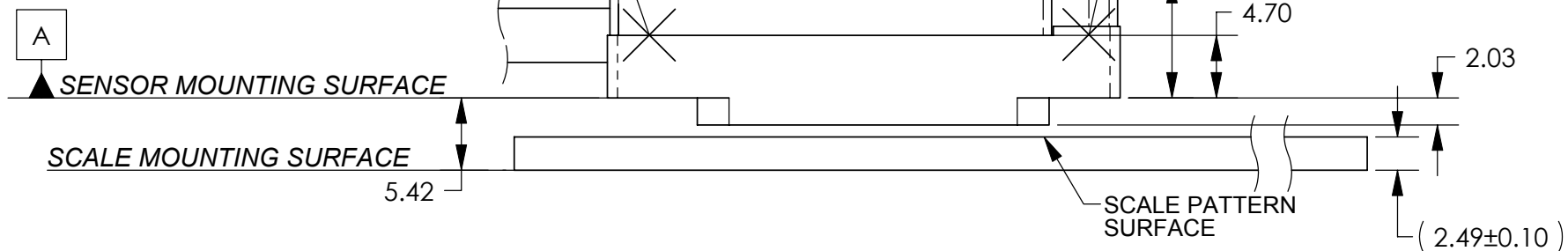
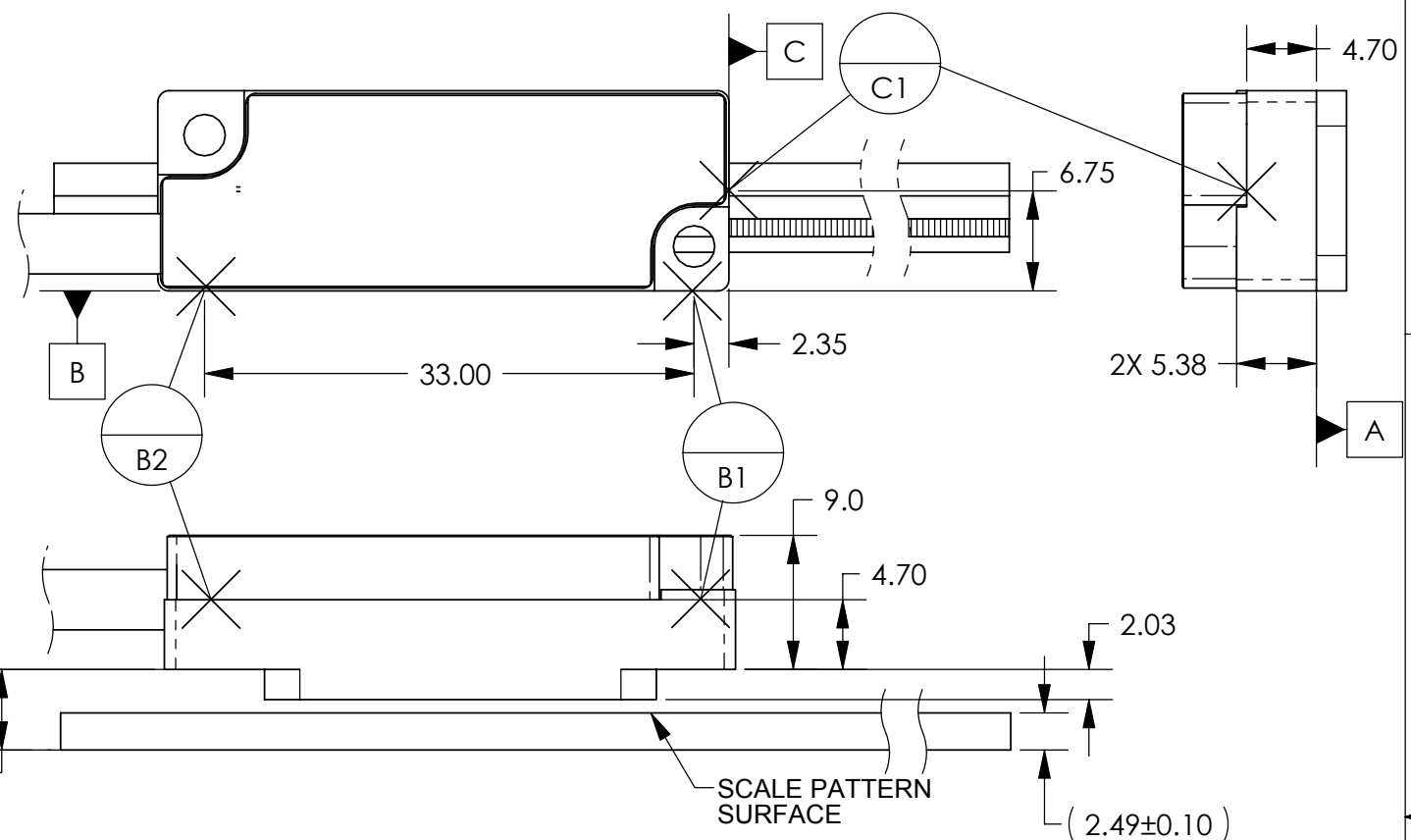
SCALE: CAD FILE: 3RD ANGLE PROJECTION SHEET 4 OF 4

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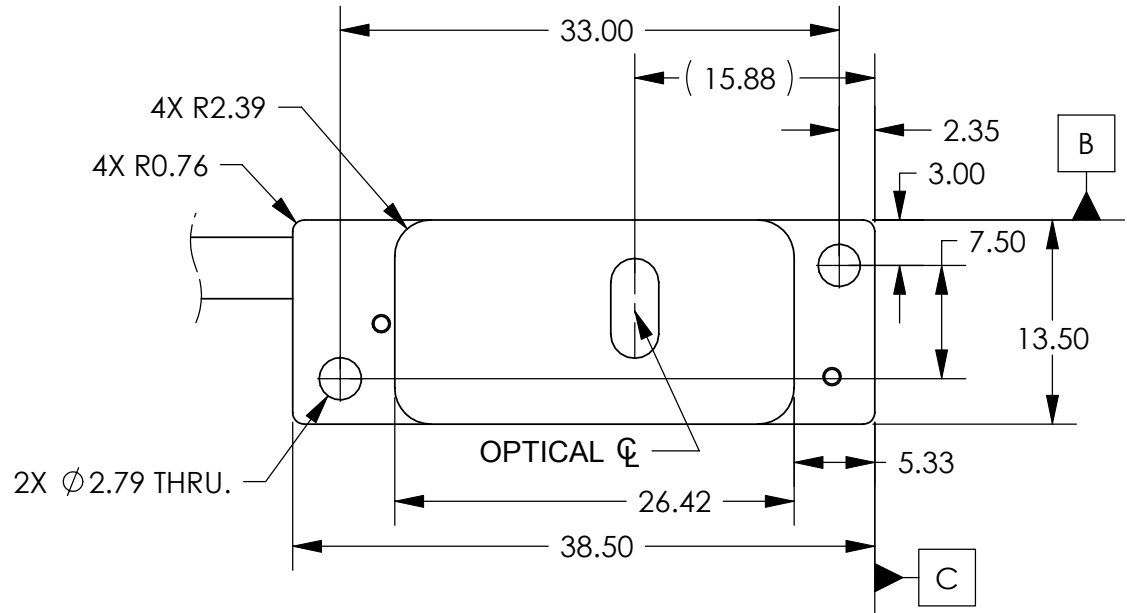
REVISIONS				
LTR	ECO	DESCRIPTION	DATE	APPROVED
1	---	INITIAL	7/28/08	VB



LINEAR GLASS SCALE SHOWN IN THIS VIEW TRANSLATED IN X-AXIS OUT OF OPERATING RANGE FOR CLARITY



- NOTES:
1. RECOMMENDED MOUNTING HARDWARE:
2-56 or M2.5 SCREWS
 2. 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).
 3. HEIGHT OF SENSOR BENCHING PINS MUST NOT EXCEED HEIGHT OF SENSOR BODY (4.70mm).
 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 FOR CLEARANCE TO SCALE AND SCALE MOUNTING HARDWARE
(BENCHING SURFACES, TRENCHES, ETC.)

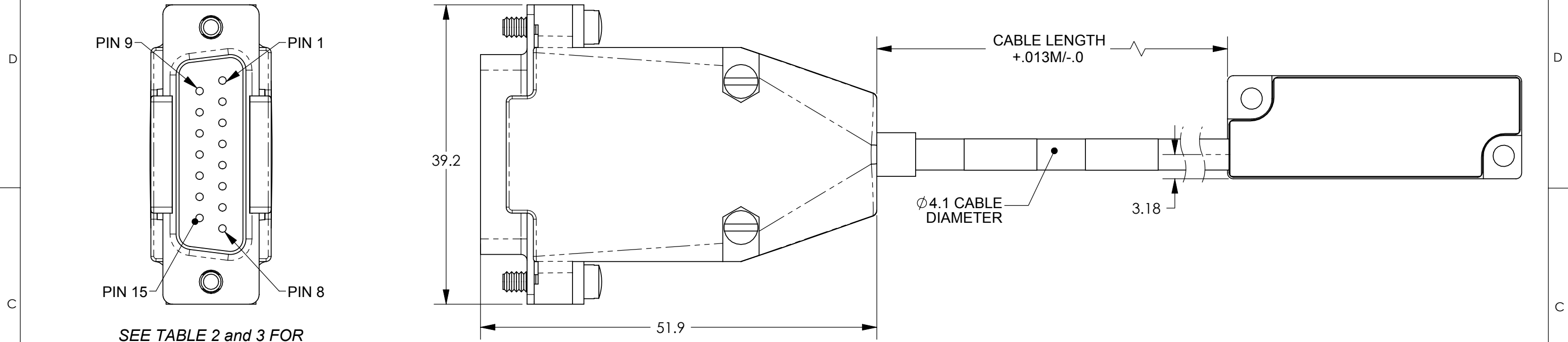


6. SEE PAGE 3 FOR DIMENSIONS FOR LOCATIONS OF REFERENCE MARKERS.
7. WHEN SCALE MOVES IN DIRECTION "A" WITH RESPECT TO A STATIONARY SENSOR, OUTPUT SIGNAL A+ (PIN 14) LEADS OUTPUT SIGNAL B+ (PIN 13). THIS APPLIES TO QUADRATURE SENSOR ONLY.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS DIM. APPLY AFTER PROCESSING INTERPRET ALL GEOMETRIC TOLS. PER ANSI Y14.5M-1994 TOLERANCES ARE: DECIMALS: X ± .25 .XX ± .13	APPROVALS	DATE	GSI MicroE Systems Division of GSI 8 Erie Drive Natick, MA 01760 DESCRIPTION: INTERFACE, ENCODER, 20um, SHORT LINEAR SCALE w/INDEX and REFERENCE MARKERS, MERCURY II 5000 SENSOR
	DRAWN S.BUTURLIA	7/11/08	
	CHECKED A.GOLDMAN	7/23/08	
	ENGRG.		
	MFG ENG		
	QA		

SIZE	DWG. NO.	REV.
B	ID-00354	1
SCALE:	CAD FILE:	3RD ANGLE PROJECTION SHEET 1 OF 3

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SEE TABLE 2 and 3 FOR PIN FUNCTIONS

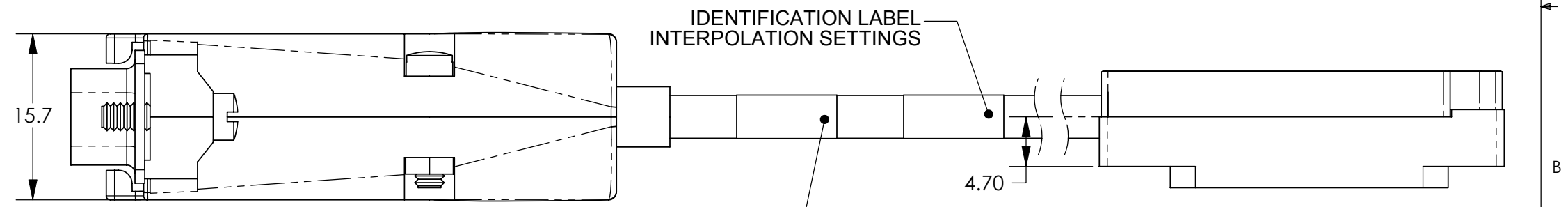


TABLE 2.

Mercury II 5000 15-Plug Quadrature Output

Pin	Function
1	RL+
2	GND
3	RL-
4	I-
5	B-
6	A-
7	5V
8	5V
9	GND
10	LL+
11	LL-
12	I+
13	B+
14	A+
15	Inner Shield

TABLE 3.

Mercury II 5000 15-Plug Serial Output

Pin	Function
1	nCS+
2	GND
3	nCS-
4	DIAG_IN_OUT-
5	SCLOCK_OUT-
6	SDATA_OUT-
7	5V
8	5V
9	GND
10	SCLOCK_IN+
11	SCLOCK_IN-
12	DIAG_IN_OUT+
13	SCLOCK_OUT+
14	SDATA_OUT+
15	Inner Shield

Cable Lengths
1M
5M
Custom

UNITS: mm

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Natick, MA 01760

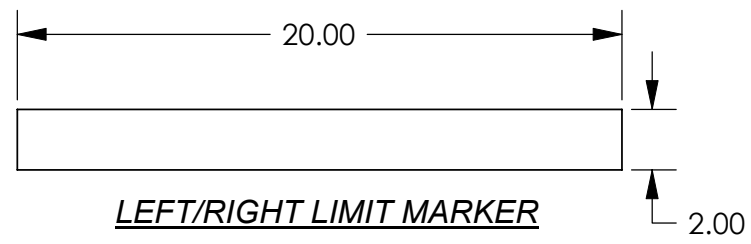
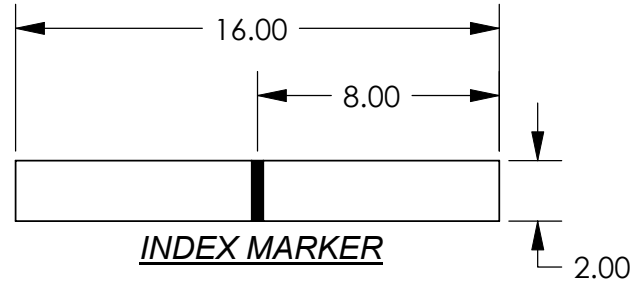
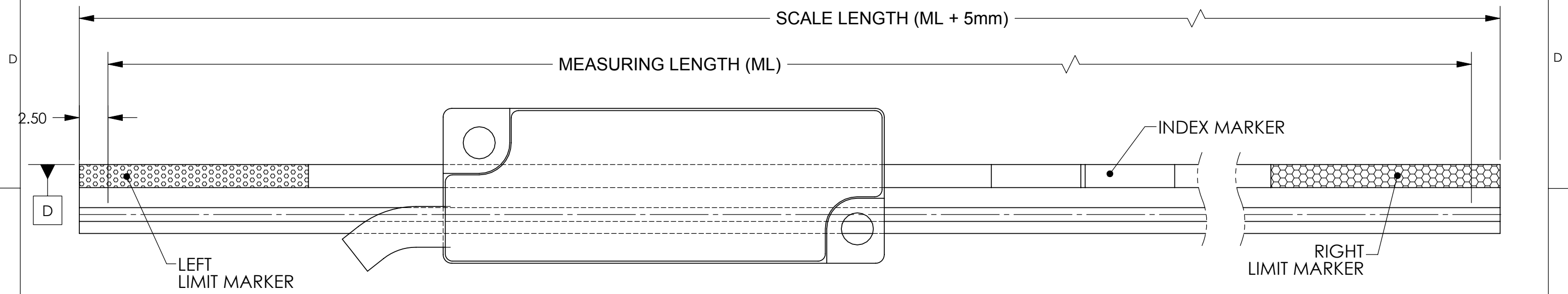
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SIZE	DWG. NO.	REV.
B	ID-00354	1

SCALE: CAD FILE: SHEET 2 OF 3

8 7 6 5 4 3 2 1

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- NOTES:
- NOTE DATUM EDGE OF GLASS SCALE AND REFERENCE MARKER REGION BEFORE APPLYING MARKERS.
 - LIMITS AND INDEX MARKERS ARE OPTIONAL (SEE INSTALLATION MANUAL).
 - LIMITS AND INDEX MARKERS SHALL NOT OVERLAP (MAY CAUSE INTERFERENCE WITH SENSOR).
 - FOR LONGER OR SHORTER LENGTHS OF MARKERS CALL MICROE SYSTEMS FOR DETAILS.
 - FOR SHORTER LENGTHS OF LINEAR GLASS THAN 70mm CONTACT MICROE SYSTEMS FOR REQUIREMENTS.
 - LINEAR GLASS SCALES CAN HAVE INDEX AND LIMIT MARKERS PRINTED ON THEM IN LOCATION DESIRED BY CUSTOMER, CONTACT MICROE SYSTEMS FOR FURTHER DETAILS.

Scale	Measuring Length (ML)	Scale Length
MILXXX	XXXmm - 5mm	XXXmm
(Min.) MIL70	70mm - 5mm = 65mm	70mm
(Max.) MIL130	130mm - 5mm = 125mm	130mm

UNITS: mm

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 Natick, MA 01760

DESCRIPTION: INTERFACE, ENCODER, 20um, SHORT LINEAR SCALE w/INDEX and REFERENCE MARKERS, MERCURY II 5000 SENSOR

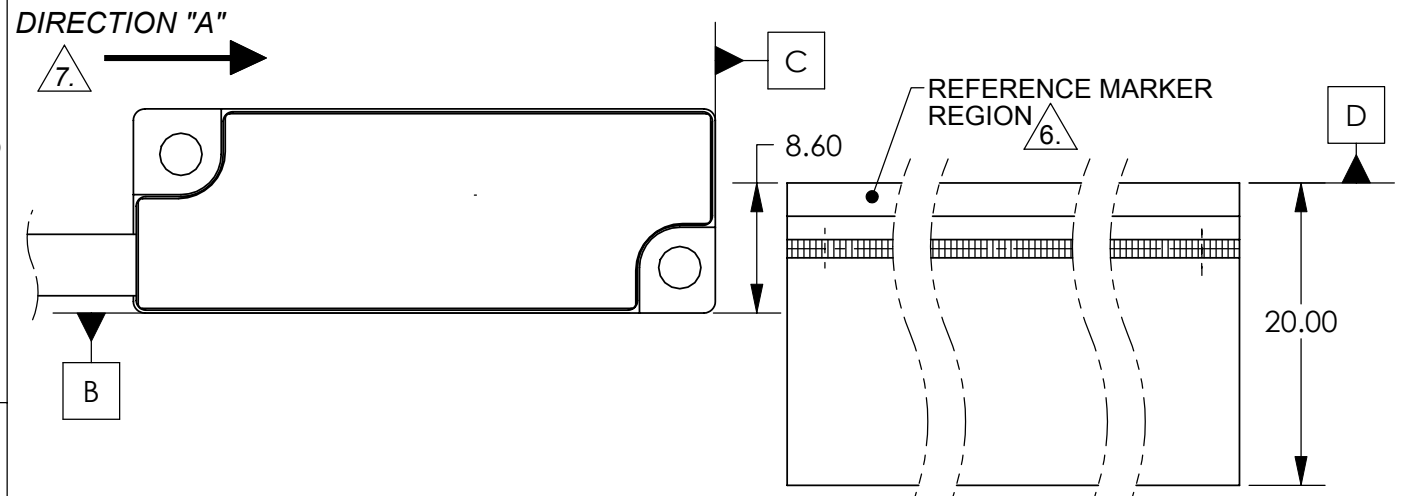
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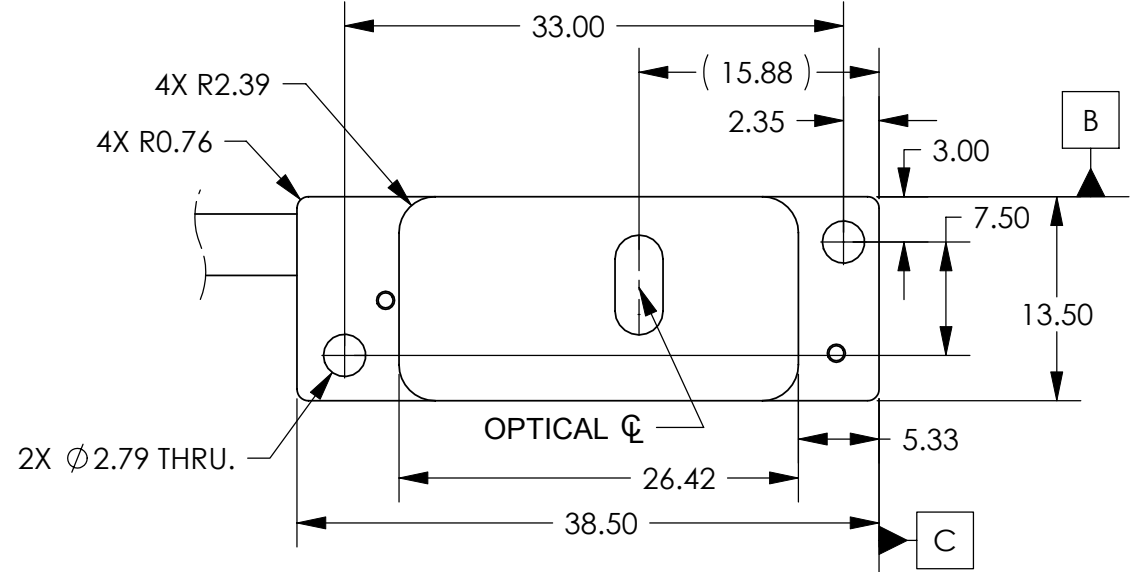
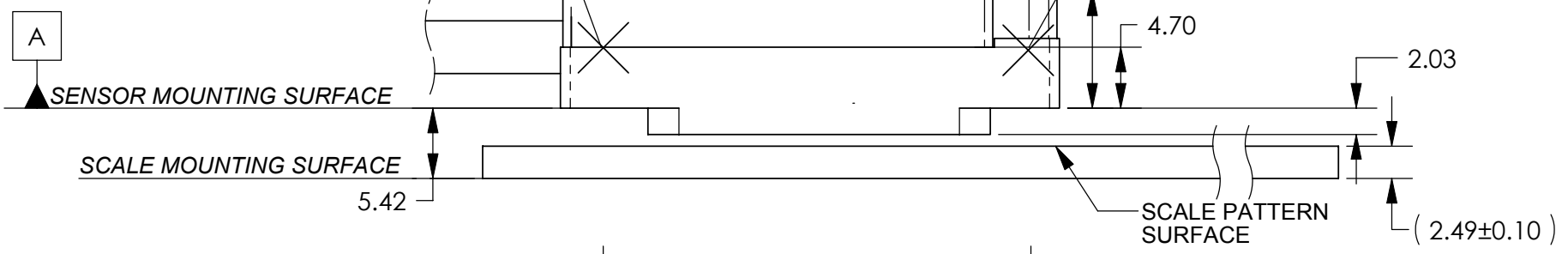
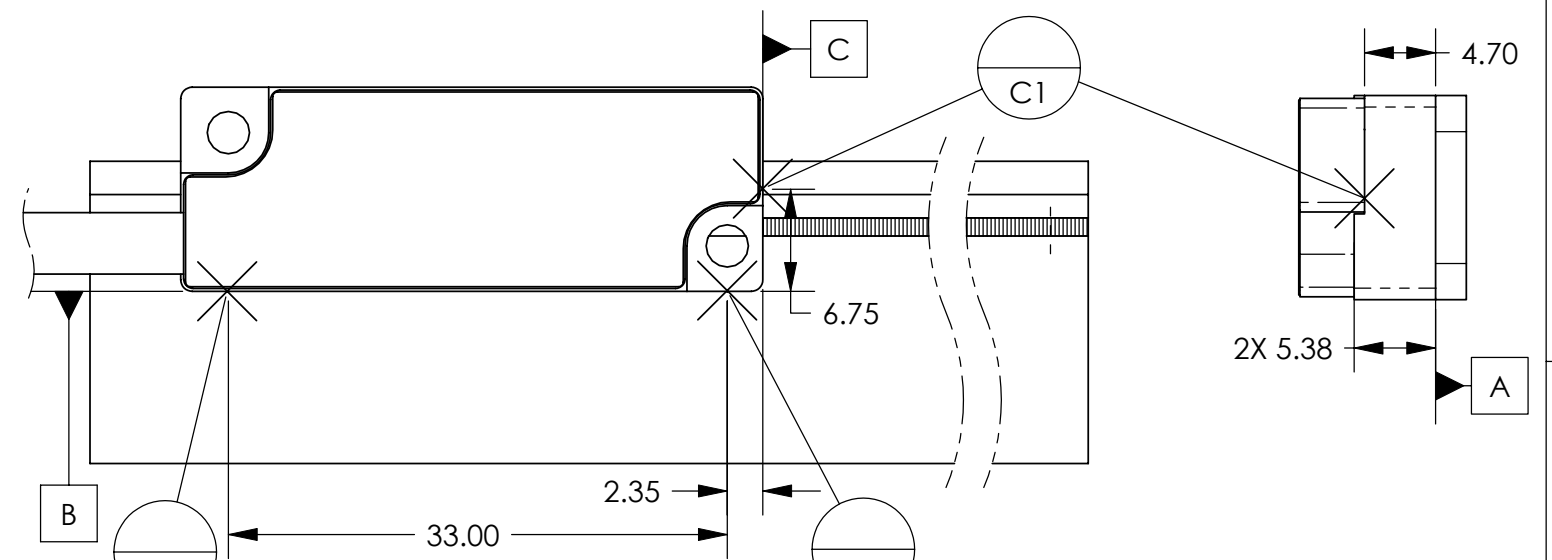
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LTR	ECO	DESCRIPTION	DATE	APPROVED
1	---	INITIAL	7/28/08	VB



LINEAR GLASS SCALE SHOWN IN THIS VIEW TRANSLATED IN X-AXIS OUT OF OPERATING RANGE FOR CLARITY



- NOTES:**
1. RECOMMENDED MOUNTING HARDWARE:
2-56 or M2.5 SCREWS
 2. 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).
 3. HEIGHT OF SENSOR BENCHING PINS MUST NOT EXCEED HEIGHT OF SENSOR BODY (4.70mm).
 4. HEIGHT OF SCALE BENCHING PINS NOT TO EXCEED THE THICKNESS OF THE SCALE.
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MAXIMUM: ALLOW FOR CLEARANCE TO SCALE AND SCALE MOUNTING HARDWARE (BENCHING SURFACES, TRENCHES, ETC.)
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UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS DIM. APPLY AFTER PROCESSING INTERPRET ALL GEOMETRIC TOLS. PER ANSI Y14.5M-1994

TOLERANCES ARE:
DECIMALS: .X ± .25 .XX ± .13
ANGULAR: ±30 MIN.

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DRAWN	S.BUTURLIA	7/11/08
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MFG ENG		
QA		

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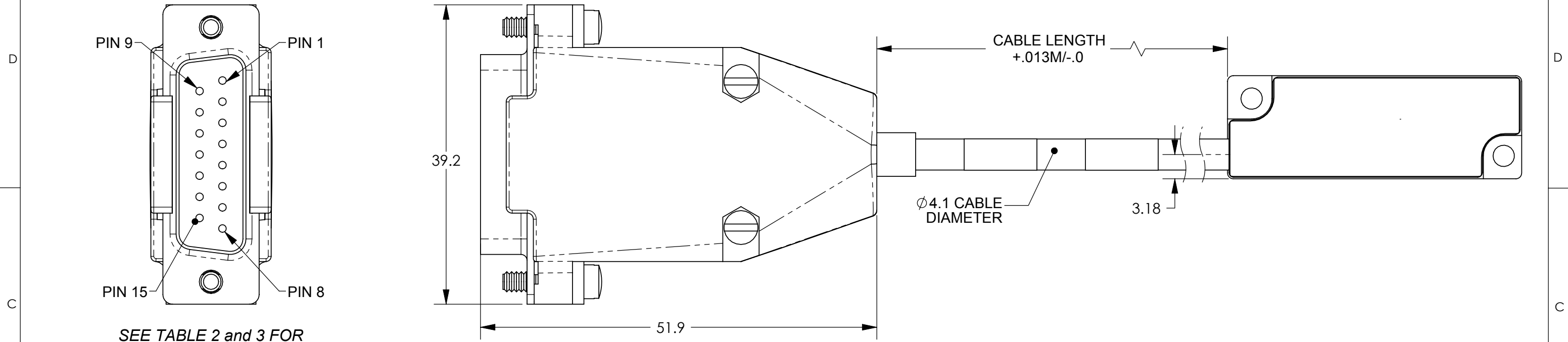
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SIZE: B DWG. NO. ID-00355 REV. 1

SCALE: CAD FILE: 3RD ANGLE PROJECTION SHEET 1 OF 3

UNITS: mm

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SEE TABLE 2 and 3 FOR PIN FUNCTIONS

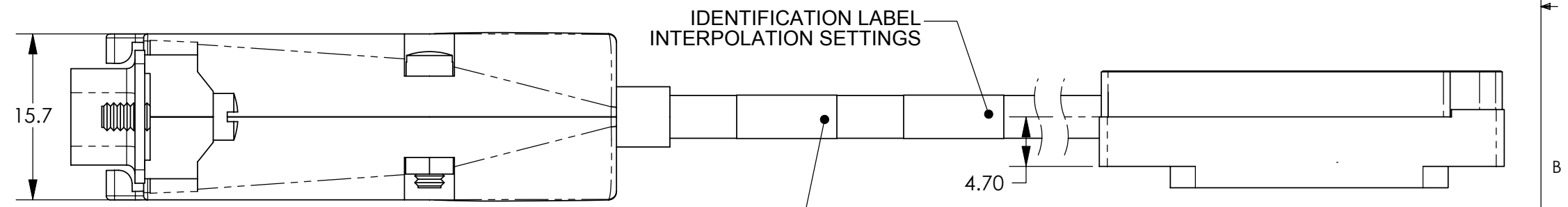


TABLE 2.

**Mercury II 5000 15-Plug
Quadrature Output**

Pin	Function
1	RL+
2	GND
3	RL-
4	I-
5	B-
6	A-
7	5V
8	5V
9	GND
10	LL+
11	LL-
12	I+
13	B+
14	A+
15	Inner Shield

TABLE 3.

**Mercury II 5000 15-Plug
Serial Output**

Pin	Function
1	nCS+
2	GND
3	nCS-
4	DIAG_IN_OUT-
5	SCLOCK_OUT-
6	SDATA_OUT-
7	5V
8	5V
9	GND
10	SCLOCK_IN+
11	SCLOCK_IN-
12	DIAG_IN_OUT+
13	SCLOCK_OUT+
14	SDATA_OUT+
15	Inner Shield

IDENTIFICATION LABEL
SENSOR P/N, SERIAL#

Cable Lengths	
1M	
5M	
Custom	

UNITS: mm

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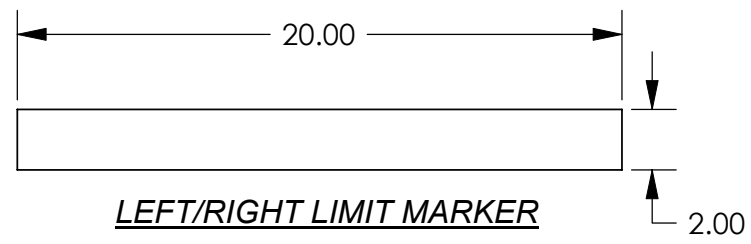
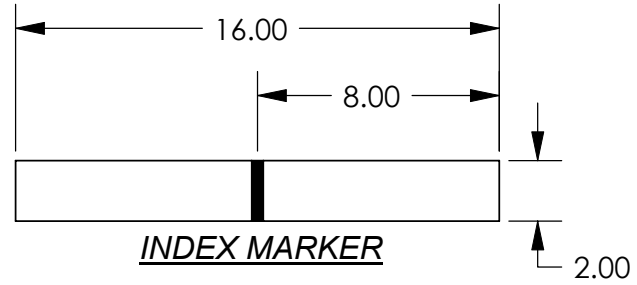
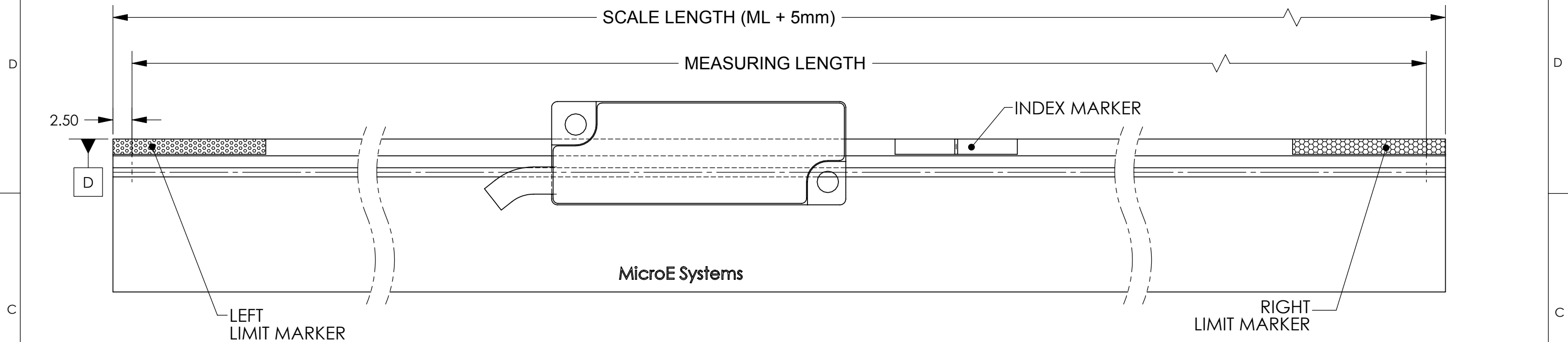
8 Erie Drive
Natick, MA 01760

DESCRIPTION: INTERFACE, ENCODER, 20um,
LONG LINEAR SCALE w/INDEX
and REFERENCE MARKERS,
MERCURY II 5000 SENSOR

SIZE B	DWG. NO. ID-00355	REV. 1
SCALE:	CAD FILE:	3RD ANGLE PROJECTION SHEET 2 OF 3

8 7 6 5 4 3 2 1

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- NOTES:
- NOTE DATUM EDGE OF GLASS SCALE AND REFERENCE MARKER REGION BEFORE APPLYING MARKERS.
 - LIMITS AND INDEX MARKERS ARE OPTIONAL (SEE INSTALLATION MANUAL).
 - LIMITS AND INDEX MARKERS SHALL NOT OVERLAP (MAY CAUSE INTERFERENCE WITH SENSOR).
 - FOR LONGER OR SHORTER LENGTHS OF MARKERS CALL MICROE SYSTEMS FOR DETAILS.
 - LINEAR GLASS SCALES CAN HAVE INDEX AND LIMIT MARKERS PRINTED ON THEM IN LOCATION DESIRED BY CUSTOMER, CONTACT MICROE SYSTEMS FOR FURTHER DETAILS.

Scale Identification	Measuring Length (ML)	Scale Length
MIILXXXX	XXXXmm - 5mm	XXXXmm
(Min.) MIIL135	135mm - 5mm = 130mm	135mm
(Max.) MIIL1000	1000mm - 5mm = 995mm	1000mm

UNITS: mm

GSI *MicroE Systems*
 Division of GSI

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 Natick, MA 01760

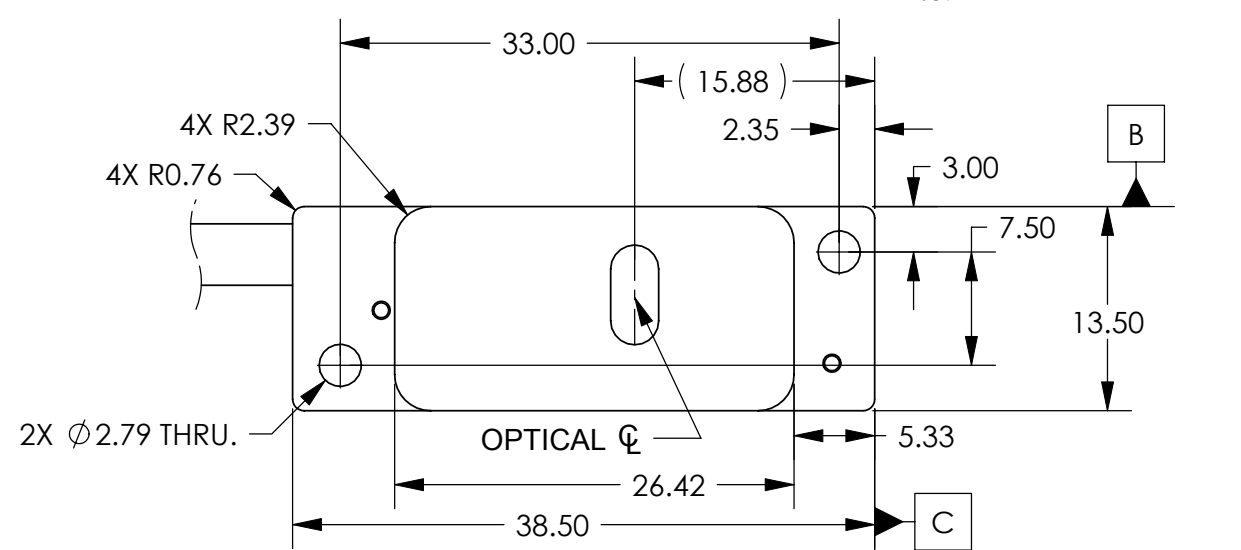
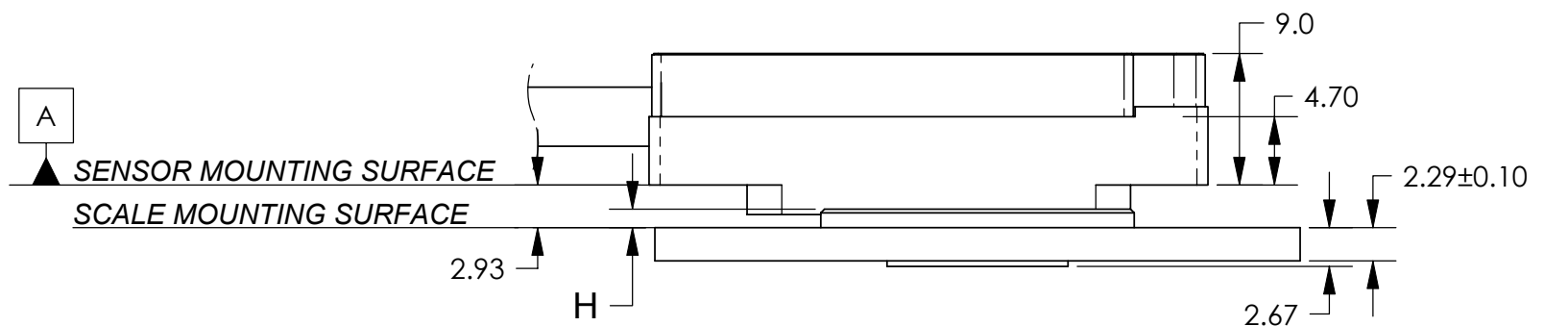
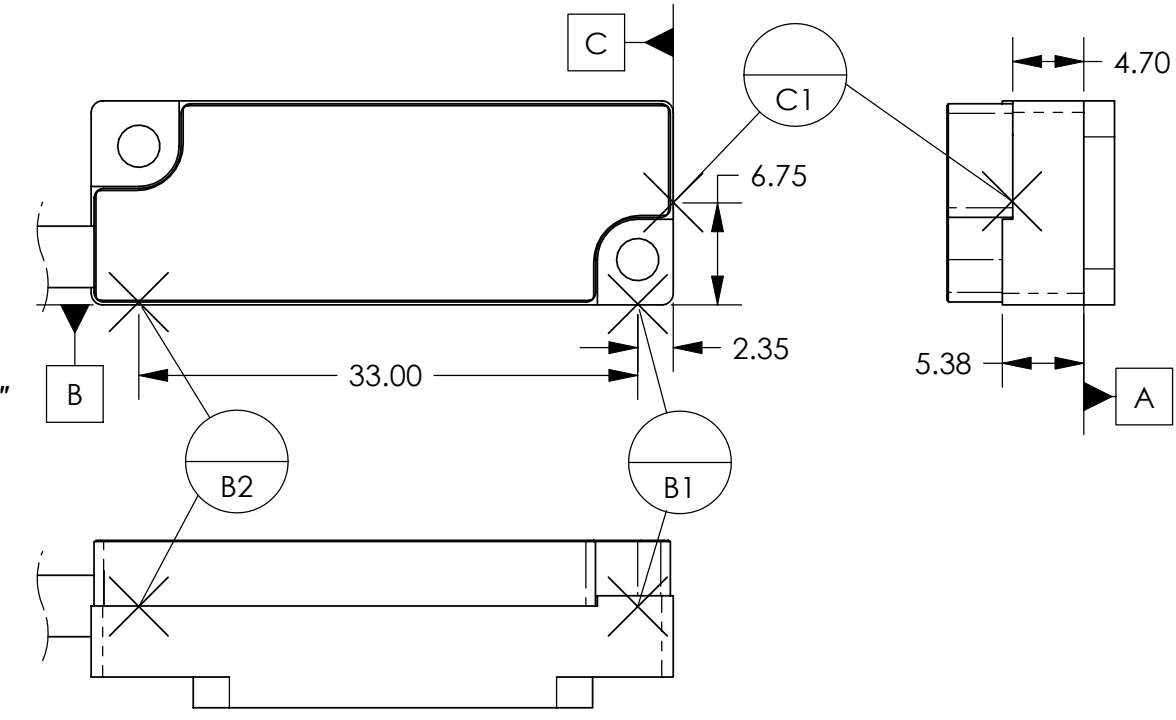
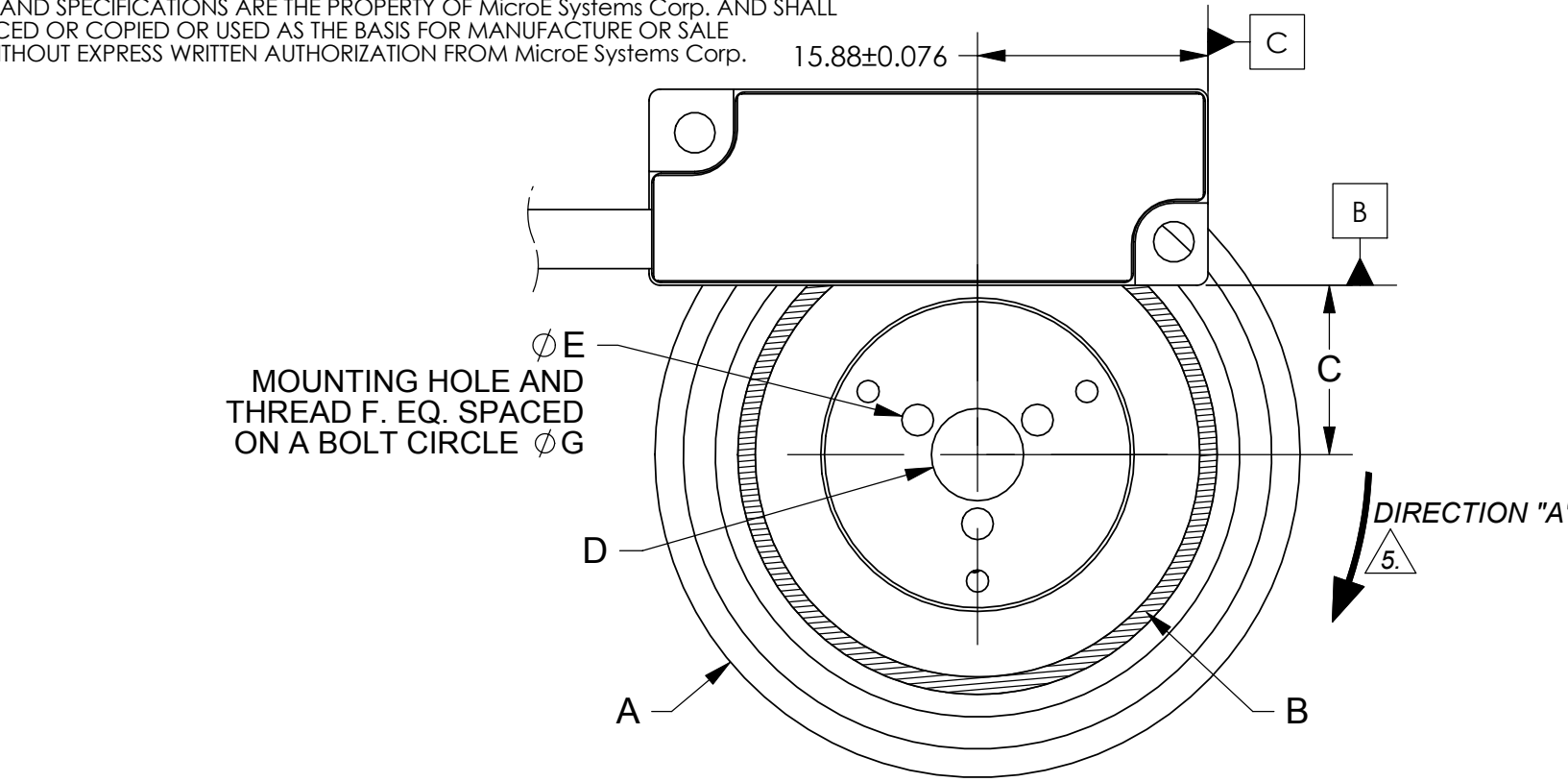
DESCRIPTION: INTERFACE, ENCODER, 20um, LONG LINEAR SCALE w/INDEX and REFERENCE MARKERS, MERCURY II 5000 SENSOR

SIZE B	DWG. NO. ID-00355	REV. 1
SCALE:	CAD FILE:	3rd ANGLE PROJECTION SHEET 3 OF 3

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1
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REVISIONS				
LTR	ECO	DESCRIPTION	DATE	APPROVED
1	---	INITIAL	7/28/08	VB



- NOTES:**
- RECOMMENDED MOUNTING HARDWARE:
2-56 or M2.5 SCREWS
 - 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 NOT EXCEED HEIGHT OF SENSOR BODY (4.70mm).
 - RECOMMENDED SENSOR MOUNTING PLATE THICKNESS:
MINIMUM: 4 SCREW THREADS
MAXIMUM: ALLOW FOR CLEARANCE TO SCALE AND SCALE MOUNTING HARDWARE (BENCHING SURFACES, TRENCHES, ETC.)
 - WHEN SCALE MOVES IN DIRECTION "A" WITH RESPECT TO A STATIONARY SENSOR, OUTPUT SIGNAL A+ (PIN 14) LEADS OUTPUT SIGNAL B+ (PIN 13). THIS APPLIES TO QUADRATURE SENSOR ONLY.

SCALE/HUB IDENTIFICATION AND SIZE

Scale/Hub Identification	Counts/Rev	Dim. A Scale O.D.	Scale I.D.	Dim. B Optical Dia.	Dim. C Mounting Dim.	Dim D. Hub I.D.	Dim E. Mounting Hole Dia.	Thread F	Dim G. Bolt Circle	Dim. H Hub Height
R4513 / HI	5,000	44.45	12.70+/-0.13	31.83	11.66+/-0.05	6.358+.013/-0.000	1.78	2-56	9.53	1.27
R6425 / HJ	8,192	63.50	25.40+/-0.13	52.15	21.82+/-0.05	12.708+.013/-0.000	3.45	8-32	19.05	1.52
R12151 / HK	16,384	120.65	50.80+/-0.13	104.30	47.90+/-0.05	25.408+.013/-0.000	3.45	8-32	38.10	2.03

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

TOLERANCES ARE:
 DECIMALS: .X ± .25
 .XX ± .13
 ANGULAR: ±30 MIN.

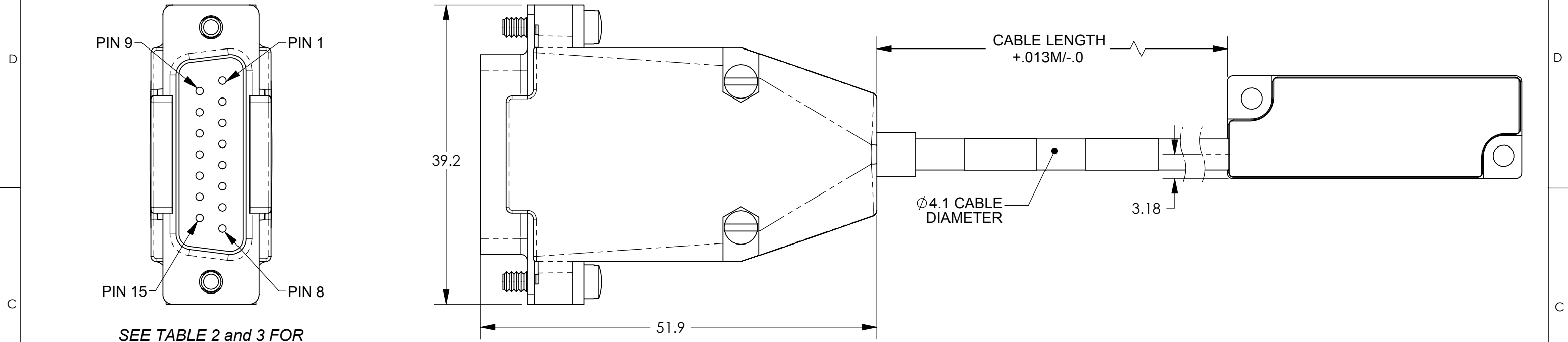
APPROVALS	DATE
DRAWN S.BUTURLIA	7/11/08
CHECKED A.GOLDMAN	7/23/08
ENGRG.	
MFG ENG	
QA	

GSI MicroE Systems
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DESCRIPTION:
 INTERFACE, ENCODER, 20um, ROTARY SCALE/ w/INDEX and HUB, MERCURY II 5000 SENSOR

SIZE B DWG. NO. ID-00356 REV. 1
 SCALE: CAD FILE: SHEET 1 OF 2

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SEE TABLE 2 and 3 FOR PIN FUNCTIONS

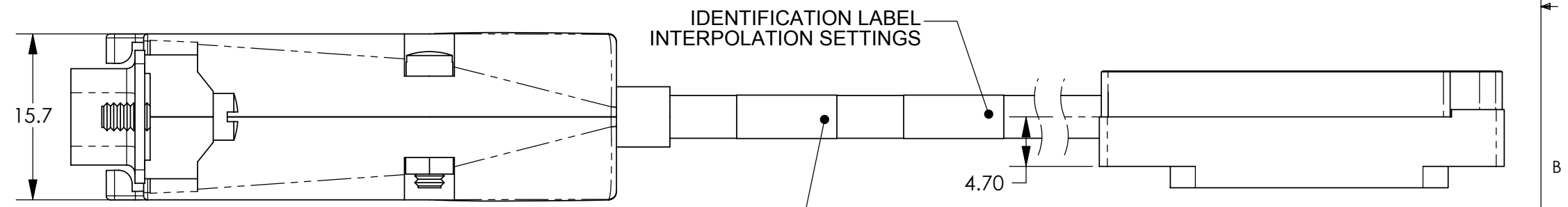


TABLE 2.

Mercury II 5000 15-Plug Quadrature Output	
Pin	Function
1	RL+
2	GND
3	RL-
4	I-
5	B-
6	A-
7	5V
8	5V
9	GND
10	LL+
11	LL-
12	I+
13	B+
14	A+
15	Inner Shield

TABLE 3.

Mercury II 5000 15-Plug Serial Output	
Pin	Function
1	nCS+
2	GND
3	nCS-
4	DIAG_IN_OUT-
5	SCLOCK_OUT-
6	SDATA_OUT-
7	5V
8	5V
9	GND
10	SCLOCK_IN+
11	SCLOCK_IN-
12	DIAG_IN_OUT+
13	SCLOCK_OUT+
14	SDATA_OUT+
15	Inner Shield

IDENTIFICATION LABEL SENSOR P/N, SERIAL#

Cable Lengths	
1M	
5M	
Custom	

UNITS: mm

GSI **MicroE Systems**
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DESCRIPTION:
INTERFACE, ENCODER, 20um,
ROTARY SCALE w/INDEX and HUB,
MERCURY II 5000 SENSOR

SIZE	DWG. NO.	REV.
B	ID-00356	1

SCALE: CAD FILE: SHEET 2 OF 2