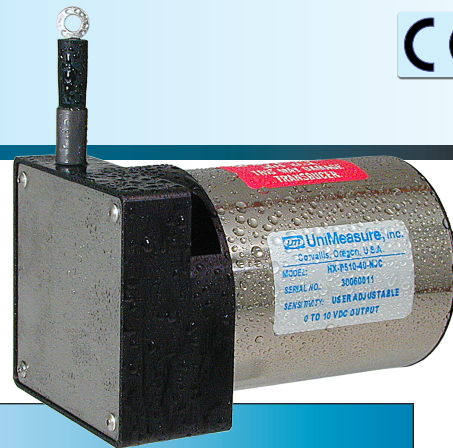


# HX-VP SERIES

## VELOCITY-POSITION OUTPUT



The UniMeasure HX-VP Series combines a self-generating tachometer and a precision potentiometer to give an output of both velocity and analog position. Standard position output is ratiometric voltage. Optionally available position outputs include ratiometric voltage from a bridge circuit, 4 to 20 mA, 0 to 10 VDC, and  $\pm 10$  VDC. See HX-PB, HX-P420 and HX-P510 data sheets for electrical specifications.

### SPECIFICATIONS

FOR HX-VPB, HX-VP420 AND HX-VP510 SERIES SPECIFICATIONS, SEE HX-PB, HX-P420, AND HX-P510 SERIES PAGES.

#### GENERAL

Available Measurement Ranges ..... See Supplemental Data<sup>[1]</sup>, Table 12  
 Connector ..... MS3102A-14S-6P  
 Mating Connector ..... MS3106E-14S-6S

#### PERFORMANCE

Positional Linearity (HX-VPA Only)  
 2", 3", 4" & 5" Ranges .....  $\pm 0.25\%$  Full Scale  
 10", 15", 20" & 25" Ranges .....  $\pm 0.15\%$  Full Scale  
 All other ranges .....  $\pm 0.10\%$  Full Scale  
 Repeatability .....  $\pm 0.015\%$  Full Scale  
 Positional Resolution ..... Essentially Infinite

#### ENVIRONMENTAL

Thermal Coeff of potentiometer ....  $\pm 100$  PPM/ $^{\circ}$ C max.  
 Operating temperature .....  $-40^{\circ}$ C to  $+95^{\circ}$ C  
 Operating humidity ..... 100%  
 Vibration ..... 15 G's 0.1 ms max.  
 Shock ..... 50 G's 0.1 ms max.

#### INGRESS PROTECTION (Exclusive of Wire Rope Area)

Standard ..... IP-65 (NEMA 4)  
 Optional ..... IP-68 (NEMA 6)<sup>[2]</sup>

#### ELECTRICAL (Position)

Input Impedance ("A" Circuit) .....  $1000\Omega \pm 10\%$   
 Output Impedance ("A" Circuit) ..... 0 to  $1000\Omega$   
 Excitation Voltage ..... 30 Volts Max. AC or DC  
 Output Voltage Change Over  
 Full Range of Transducer ..... 92% to 98% of Excitation Voltage

#### ELECTRICAL (Velocity)

Output ..... See Table 11  
 Linearity .....  $\pm 0.10\%$  F.S. with 10 VDC Max Output  
 Ripple ..... 3% Max.  
 Output Impedance .....  $350\Omega$

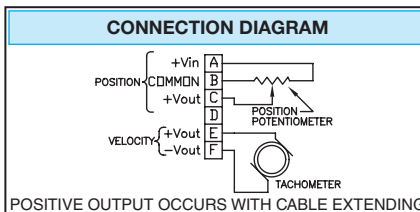


TABLE 11—VELOCITY OUTPUT

MEASUREMENT RANGE	VELOCITY OUTPUT	
	mV/in/sec	mV/cm/sec
2, 10	200	78
3, 15, 30	136	53
4, 20, 40	103	40
5, 25, 50	82	32
6, 60	69	27
80	52	20
100	180	71
ALL RANGES GREATER THAN 100"	180	71

#### FOOTNOTES TO SPECIFICATIONS

- Supplemental Data section located at end of HX Series pages.
- Submersion to 2m (6.5') maximum depth in fresh water.

### MODEL NUMBER CONFIGURATION

**HX-VP** E 0 1 2 3 4 5 6 7 8 9

#### BASIC CONFIGURATION (FOR ALL RANGES)

**HX-VPA-50-S10-N1S-1BC**

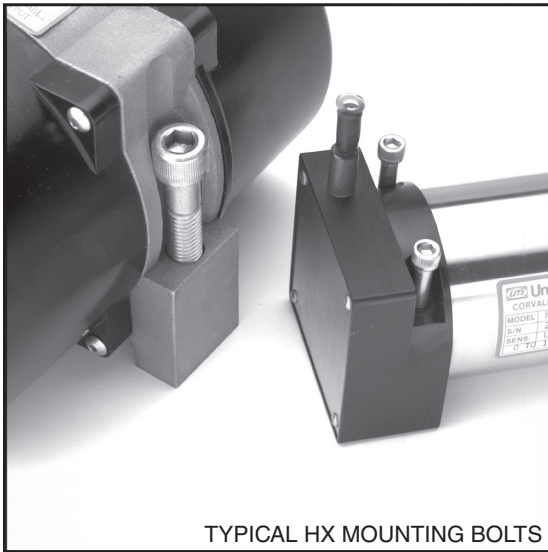
<p><b>E ELECTRICAL OUTPUT</b>                  POSITION ELECTRICAL OUTPUT                  A ..... Voltage Divider Circuit                  B ..... Bridge Circuit                  420 ..... 4 to 20 mA                  510 ..... 0 to 10 VDC</p>	<p><b>0 RANGE</b>                  Select Measurement Range From Supplemental Data, Table 12 (next page), Insert Corresponding Measurement Range Designator</p> <p><b>1 WIRE ROPE</b>                  S ..... Stainless Steel (See Supplemental Data, Table 12)                  N ..... <math>\varnothing 0.18</math> (0.45 mm) Nylon Jacketed Stainless Steel Ranges to 80" (2m) only, (formerly NJC)                  J ..... <math>\varnothing 0.37</math> (0.94 mm) Nylon Jacketed Stainless Steel Ranges 100" (2.5m) to 500" (12.7m) only.</p> <p><b>2 WIRE ROPE TENSION</b>                  1 ..... Standard                  2 ..... Reduced (Ranges to 80" only)</p> <p><b>3 WIRE ROPE EXIT DIRECTION</b>                  Use Number designators shown RANGES TO 80" (2000 mm)</p> <p>RANGES 100" TO 2000" (2.5 m TO 50 M)</p>	<p><b>4 N</b> ..... Required Designator</p> <p><b>5 POTENTIOMETER VALUE</b>                  VPB                  VP420                  VP510                  0 ..... Required Designator                  1 ..... 1K<math>\Omega</math>                  3 ..... 5K<math>\Omega</math>*                  4 ..... 10K<math>\Omega</math>*                  *Not Available Ranges 2" to 6"                  SEE SUPPLEMENTAL DATA FOR LINEARITY OPTION</p> <p><b>6 ELECTRICAL OUTPUT POLARITY</b>                  S ..... Standard (increasing output as wire rope is extended)                  R ..... Reversed (decreasing output as wire rope is extended)</p>	<p><b>7 INGRESS PROTECTION</b>                  1 ..... IP-65 (NEMA 4)                  2 ..... IP-68 (NEMA 6)                  3 ..... IP-68 (NEMA 6) Corrosion Resistant Construction</p> <p><b>8 IP-65-NEMA 4 CONNECTOR</b>                  B ..... 6 Pin 3102E Body Mounted Connector  <b>IP-68-NEMA 6 ELECTRICAL CABLE</b>                  P ..... Bulkhead Fitting w/ 0.3m (12") Electrical Cable                  3 ..... Bulkhead Fitting w/ 3m (10') Electrical Cable                  4 ..... Bulkhead Fitting w/ 4m (13.5') Electrical Cable                  5 ..... Bulkhead Fitting w/ 5m (16.5') Electrical Cable                  6 ..... Bulkhead Fitting w/ 6m (20') Electrical Cable                  7 ..... Bulkhead Fitting w/ 7m (23') Electrical Cable</p> <p><b>9 IP-65-NEMA 4 MATING CONNECTOR</b>                  C ..... IP-65 Mating Connector Included                  K ..... IP-65 Mating Connector Omitted*                  *Electrical cable with mating connector may be ordered separately as part number 10119-xM where 'x' is the length required in meters.  <b>IP-68-NEMA 6 CABLE MOUNTED CONNECTOR</b>                  N ..... No connector on end of electrical cable                  K ..... IP-68 Cable to cable connector with <b>NO</b> mating connector**                  **Electrical cable with mating connector may be ordered separately as part number 10424-xM where 'x' is the length required in meters. Mating connector alone unavailable.</p>
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#### NOTES FOR OPTION BOXES 7, 8, and 9

**IP-65 (NEMA 4):** Transducer equipped with body mounted connector and with or without mating connector. Mating connector with electrical cable available separately as part number 10119-xM where 'x' is length of electrical cable in meters.

**IP-68 (NEMA 6):** Transducer equipped with bulkhead fitting and length of electrical cable. Remote end of electrical cable may be outfitted with water proof connector. Mating connector with electrical cable available separately as part number 10424-xM where 'x' is length of electrical cable in meters.

### MECHANICAL SPECIFICATIONS



TYPICAL HX MOUNTING BOLTS

**AVAILABLE MEASUREMENT RANGES** .... See Table 12

**CONSTRUCTION**

- Ranges 80" (2 m) and under ..... Anodized Aluminum Mounting Base  
Stainless Steel & Anodized Aluminum Housing
- Ranges 100" (2.5 m) and greater ..... Stainless Steel Mounting Base  
High Impact, Corrosion Resistant  
Thermoplastic Housings
- Wire Rope Tension..... See Table 12
- Wire Rope Diameter ..... See Table 12
- Weight ..... See Table 12
- Connector ..... MS3102A-14S-6P
- Mating Connector ..... MS3106E-14S-6S
- Optional NEMA 6 Capability ..... Bulkhead fitting with shielded twisted pair cable

**Life<sup>(1)</sup>**

- Ranges 2" to 6" ..... 5,000,000 full stroke cycles
- Ranges 10" to 25" ..... 500,000 full stroke cycles
- Ranges 30" to 400" ..... 250,000 full stroke cycles
- Ranges 500" to 2000" ..... 200x10<sup>6</sup> lineal inches

**NOTES:**

1. With 1K ohm potentiometer, wire rope misalignment 2° maximum at full stroke, relatively dust free environment, nylon jacketed wire rope on units with ranges 80" and less.

Use value from this column to indicate overall measurement range

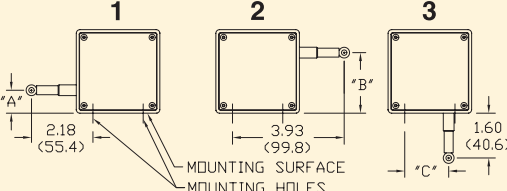
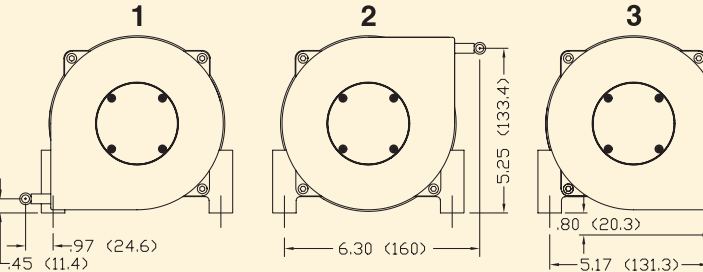


Check mark indicates available measurement range

# TABLE 12

MEASUREMENT RANGE DESIGNATOR	STANDARD MEASUREMENT RANGES		APPLICABLE SERIES			WIRE ROPE TENSION (NOMINAL)		WIRE ROPE DIAMETER		TRANSDUCER WEIGHT		Product Photo
	(in)	(mm)	HX-PA HX-PB HX-P420 HX-P510	HX-EP	HX-V HX-VP	(oz)	(N)	(in)	(mm)	(lb)	(Kg)	
2	2	50	✓	-	✓	34	9.4	.016	0.4	2	0.9	
3	3	75	✓	-	✓	24	6.7	.016	0.4	2	0.9	
4	4	100	✓	-	✓	24	6.7	.016	0.4	2	0.9	
5	5	125	✓	-	✓	19	5.3	.016	0.4	2	0.9	
6	6	150	✓	-	✓	24	6.7	.016	0.4	2	0.9	
10	10	250	✓	✓	✓	34	9.4	.016	0.4	2	0.9	
15	15	390	✓	-	✓	24	6.7	.016	0.4	2	0.9	
20	20	500	✓	-	✓	24	6.7	.016	0.4	2	0.9	
25	25	640	✓	✓	✓	19	5.3	.016	0.4	2	0.9	
30	30	750	✓	-	✓	24	6.7	.016	0.4	2	0.9	
40	40	1000	✓	-	✓	24	6.7	.016	0.4	2	0.9	
50	50	1250	✓	✓	✓	19	5.3	.016	0.4	2	0.9	
60	60	1500	✓	✓	✓	24	6.7	.016	0.4	2	0.9	
80	80	2.0m	✓	✓	✓	21	5.8	.016	0.4	2	0.9	
100	100	2.5m	✓	✓	✓	36	10.0	.024	0.6	6.8	3.1	
120	120	3.0m	✓	✓	✓	36	10.0	.024	0.6	6.8	3.1	
150	150	3.8m	✓	✓	✓	36	10.0	.024	0.6	6.8	3.1	
200	200	5.0m	✓	✓	✓	36	10.0	.024	0.6	6.8	3.1	
250	250	6.3m	✓	✓	✓	36	10.0	.024	0.6	6.8	3.1	
300	300	7.5m	✓	✓	✓	36	10.0	.024	0.6	6.8	3.1	
350	350	8.8m	✓	✓	✓	36	10.0	.024	0.6	6.8	3.1	
400	400	10.0m	✓	✓	✓	36	10.0	.024	0.6	6.8	3.1	
500	500	12.5m	✓	✓	✓	36	10.0	.024	0.6	8.6	3.9	
600	600	15.2m	✓	✓	✓	36	10.0	.024	0.6	8.6	3.9	
800	800	20.3m	✓	✓	✓	36	10.0	.024	0.6	8.6	3.9	
1000	1000	25.4m	✓	✓	-	36	10.0	.024	0.6	12.0	5.4	
1200	1200	30.4m	✓	✓	-	36	10.0	.024	0.6	12.3	5.6	
1600	1600	40.6m	✓	✓	-	36	10.0	.024	0.6	14.1	6.4	
1800	1800	45.7m	✓	✓	-	36	10.0	.021	0.6	15.9	7.2	
2000	2000	50.8m	✓	✓	-	36	10.0	.021	0.5	16.3	7.4	

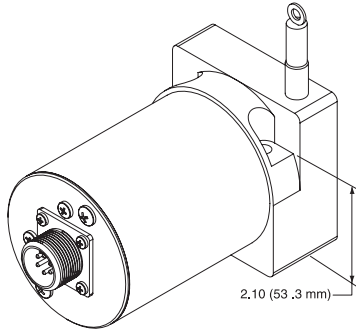
Specifications subject to change without notice

### OPTION DESCRIPTIONS

OPTION	OPTION DESIGNATOR	DESCRIPTION																												
<b>NYLON JACKETED WIRE ROPE</b> <u>RANGES TO 80" ONLY</u>	<b>N</b>	Replaces standard stainless steel wire rope with Ø.018 nylon jacketed wire rope. This option increases wire rope life dramatically but may increase non-linearity by as much as ±.05% of full scale.																												
<b>NYLON JACKETED WIRE ROPE</b> <u>RANGES 100" TO 500" ONLY</u>	<b>J</b>	Replaces standard stainless steel wire rope with Ø.037 nylon jacketed wire rope.																												
<b>ALTERNATE WIRE ROPE EXIT</b> <u>RANGES TO 80" (2.0 m)</u>	<b>1, 2, 3</b>	<div style="text-align: center;">  <p>1                      2                      3</p> <p>2.18 (55.4)                      3.93 (99.8)                      1.60 (40.6)</p> <p>“A”                      “B”                      “C”</p> <p>MOUNTING SURFACE MOUNTING HOLES</p> <table border="1" data-bbox="797 747 1300 947"> <thead> <tr> <th>RANGE</th> <th>“A”</th> <th>“B”</th> <th>“C”</th> </tr> </thead> <tbody> <tr> <td>2", 10"</td> <td>1.12 (28.4)</td> <td>1.79 (45.5)</td> <td>1.21 (30.7)</td> </tr> <tr> <td>3", 15", 30"</td> <td>.96(24.4)</td> <td>1.95 (49.5)</td> <td>1.37 (34.8)</td> </tr> <tr> <td>4", 20", 40"</td> <td>.80 (20.3)</td> <td>2.11 (53.6)</td> <td>1.53 (38.9)</td> </tr> <tr> <td>5", 25", 50"</td> <td>.64 (16.3)</td> <td>2.27 (57.7)</td> <td>1.69 (42.9)</td> </tr> <tr> <td>6", 60"</td> <td>.49 (12.4)</td> <td>2.42 (61.5)</td> <td>1.84 (46.7)</td> </tr> <tr> <td>80"</td> <td>.25 (6.4)</td> <td>2.66 (67.6)</td> <td>2.08 (52.8)</td> </tr> </tbody> </table> <p><small>Dimensions in brackets are millimeters</small></p> </div>	RANGE	“A”	“B”	“C”	2", 10"	1.12 (28.4)	1.79 (45.5)	1.21 (30.7)	3", 15", 30"	.96(24.4)	1.95 (49.5)	1.37 (34.8)	4", 20", 40"	.80 (20.3)	2.11 (53.6)	1.53 (38.9)	5", 25", 50"	.64 (16.3)	2.27 (57.7)	1.69 (42.9)	6", 60"	.49 (12.4)	2.42 (61.5)	1.84 (46.7)	80"	.25 (6.4)	2.66 (67.6)	2.08 (52.8)
RANGE	“A”	“B”	“C”																											
2", 10"	1.12 (28.4)	1.79 (45.5)	1.21 (30.7)																											
3", 15", 30"	.96(24.4)	1.95 (49.5)	1.37 (34.8)																											
4", 20", 40"	.80 (20.3)	2.11 (53.6)	1.53 (38.9)																											
5", 25", 50"	.64 (16.3)	2.27 (57.7)	1.69 (42.9)																											
6", 60"	.49 (12.4)	2.42 (61.5)	1.84 (46.7)																											
80"	.25 (6.4)	2.66 (67.6)	2.08 (52.8)																											
<b>ALTERNATE WIRE ROPE EXIT</b> <u>RANGES 100" (2.5 m) and GREATER</u>	<b>1, 2, 3</b>	<div style="text-align: center;">  <p>1                      2                      3</p> <p>1.45 (11.4)                      .97 (24.6)                      5.25 (133.4)                      .80 (20.3)                      5.17 (131.3)</p> <p>6.30 (160)</p> <p><small>Dimensions in brackets are millimeters</small></p> </div>																												
<b>NON-STANDARD POTENTIOMETER</b> <u>APPLIES TO HX-PA &amp; HX-VPA ONLY</u>	<b>3, 4</b>	Non-standard potentiometer linearity is as follows: <table border="1" data-bbox="797 1314 1252 1451"> <thead> <tr> <th>RANGE</th> <th>LINEARITY</th> </tr> </thead> <tbody> <tr> <td>5" and Below</td> <td>±1.00% of full scale</td> </tr> <tr> <td>10" to 25"</td> <td>±0.50% of full scale</td> </tr> <tr> <td>30" and above</td> <td>±0.25% of full scale</td> </tr> </tbody> </table> <p><i>Note: This option is subject to potentiometer availability.</i></p>	RANGE	LINEARITY	5" and Below	±1.00% of full scale	10" to 25"	±0.50% of full scale	30" and above	±0.25% of full scale																				
RANGE	LINEARITY																													
5" and Below	±1.00% of full scale																													
10" to 25"	±0.50% of full scale																													
30" and above	±0.25% of full scale																													
<b>REVERSED OUTPUT</b>	<b>R</b>	Output is at a maximum when wire rope is fully retracted. Output decreases as wire rope is extended. Does not apply to velocity signal.																												
<b>IP-68, (NEMA 6) CAPABILITY</b>	<b>2</b>	<div style="display: flex; align-items: center;">  <p>Connector is replaced with a bulkhead fitting and a designated length of urethane jacketed, shielded, twisted pair cable. Retraction mechanism and electrical components are sealed to IP-68, (NEMA 6) capability.</p> </div>																												
<b>CORROSION RESISTANT CONSTRUCTION</b>	<b>3</b>	All external anodized aluminum parts of transducer are replaced with stainless steel and corrosion resistant plastic. Transducer is sealed to IP-68 (NEMA 6) capability. Urethane jacketed, shielded, twisted pair cable exits unit. No connector on unit. <div style="text-align: right; margin-top: 10px;">  </div>																												

### DIMENSIONAL INFORMATION

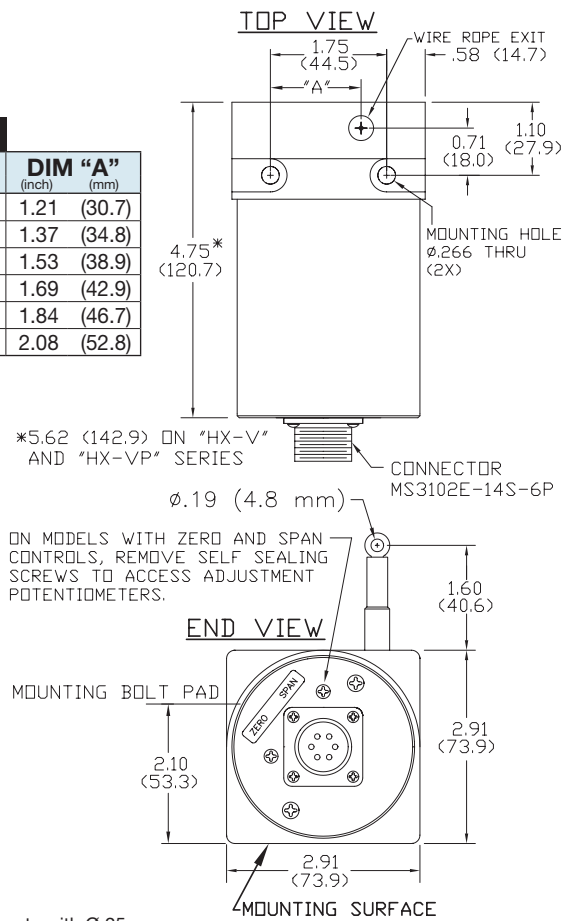
#### HX SERIES – RANGES TO 80" (2 m)



**FIG. 1**

**TABLE 13**

RANGE	DIM "A" (inch)	(mm)
2", 10"	1.21	(30.7)
3", 15", 30"	1.37	(34.8)
4", 20", 40"	1.53	(38.9)
5", 25", 50"	1.69	(42.9)
6", 60"	1.84	(46.7)
80"	2.08	(52.8)



**NOTES:**  
1. Transducer mounts with Ø.25 or M6 Socket head cap bolts.

*Dimensions in brackets are millimeters*

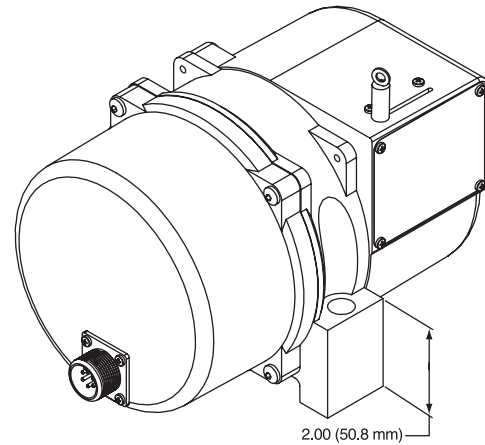
**TABLE 14**

RANGE	DIM "A" (inch)	(mm)	DIM "B" (inch)	(mm)
Ranges to 800"	7.70	(196)	3.80	(97)
1000" to 2000"	11.0	(280)	5.60	(142)

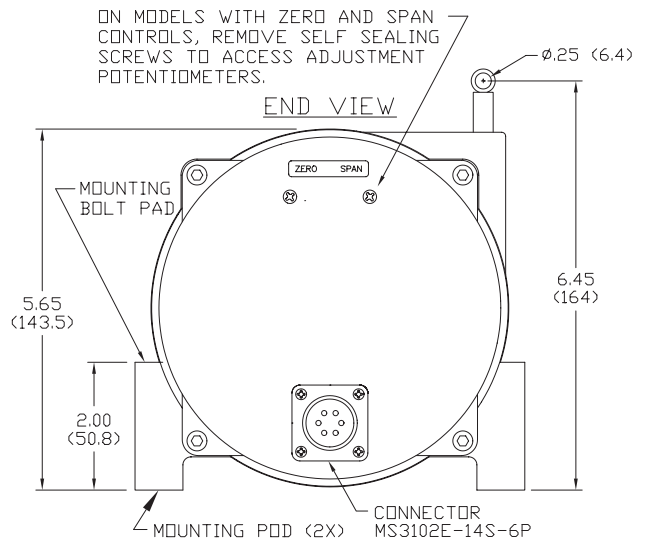
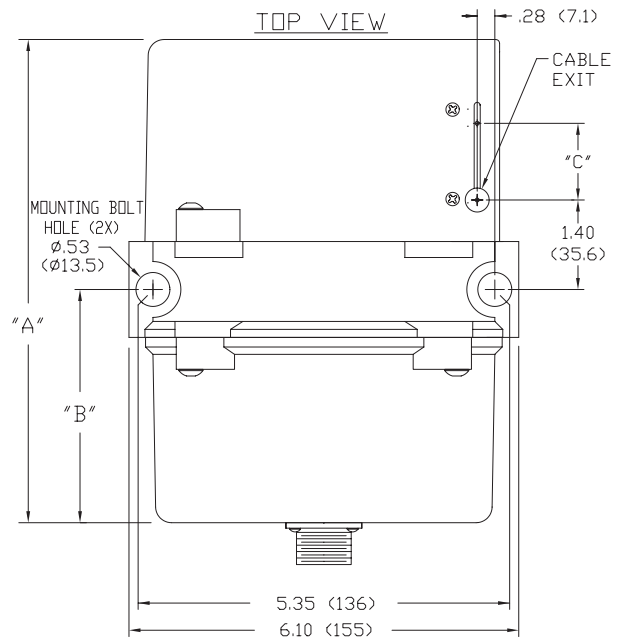
**NOTES:**  
1. Transducer mounts with Ø.50 or M12 socket head cap bolts.  
2. Dimension "C" is the cable offset that occurs as the cable is extended from the transducer. For "C" in inches,  $C = .0016 \times E$  where E = extension in inches. For "C" in millimeters,  $C = .0016 \times E$  where E = extension in mm.

*Dimensions in brackets are millimeters*

#### HX SERIES – RANGES GREATER THAN 80" (2 m)



**FIG. 2**



*Dimensions in brackets are millimeters*