

Utilizing an incremental encoder as the sensor, the UniMeasure HX-EP Series position transducer provides a two channel square wave current sinking output signal in quadrature. The standard output is a single-ended TTL compatible square. The resolution values shown in the specifications table indicate resolution for times 1 counting mode where a count is registered for one up transition in channel A. With interface electronics capable of times 2 or times 4 counting mode, a true resolutional increase of 2 or 4 may be obtained. For example, the HX-EP-50 has a resolution of approximately .004" per count in times 1 counting mode whereas the resolution is approximately .001" per count in times 4 counting mode.

The actual resolution of a HX-EP transducer differs from unit to unit because of tolerances associated with the wire rope diameter and the capstan upon which the wire rope winds. The nylon jacketed wire rope option will have the effect of slightly reducing the resolution. Linearity and repeatability remain independent of resolution.

In applications where the output count is interpreted as a percentage of total travel, resolutional differences from unit to unit are not critical. However, in applications where the digital output is to be interfaced to a digital display to give an output in engineering units, the calibration constant supplied with the transducer may be used to calculate a suitable scale multiplier to produce the correct engineering units. Alternative outputs shown in the Electrical Outputs table below are available to facilitate interfacing to a variety of different types of equipment.



### SPECIFICATIONS

#### GENERAL

Connector ..... MS3102E-14S-6P  
 Mating Connector ..... MS3106E-14S-6S  
 Available Measurement Ranges ..... See Supplemental Data<sup>(1)</sup>, Table 12

#### PERFORMANCE

Linearity ..... ±0.03% Full Scale  
 Repeatability ..... ±0.015% Full Scale  
 Resolution ..... See Table 9

#### ENVIRONMENTAL

Operating temperature ..... -20°C to +95°C  
 Storage temperature ..... -40°C to +100°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)

#### ELECTRICAL

Input Voltage ..... +5 VDC ±5% or 8-28 VDC  
 Input Current ..... 125 mA Maximum  
 Output ..... Two channel TTL square wave  
 Phase Quadrature ..... 90°±20°

TABLE 9-RESOLUTION

MODEL	RANGE		RESOLUTION <sup>[2]</sup>		RESOLUTION TOLERANCE <sup>[2]</sup>
	inch	metric	counts/inch	counts/mm	
HX-EP-10	10	250 mm	500.0	19.69	±0.30%
HX-EP-25	25	640 mm	250.0	9.84	±0.20%
HX-EP-50	50	1250 mm	250.0	9.84	±0.20%
HX-EP-60	60	1.5 m	205.8	8.10	±0.20%
HX-EP-80	80	2.0 m	155.2	6.11	±0.20%
HX-EP-100	100	2.5 m	82.9	3.26	±0.20%
ALL RANGES GREATER THAN 100"	100	2.5 m	82.9	3.26	±0.20%

#### ELECTRICAL OUTPUT

For electrical output description, waveform and wiring, See **Standard Series Supplemental Data, TABLE 8, Page 29.**

#### FOOTNOTES TO SPECIFICATIONS

- Supplemental Data section located at end of HX Series pages.
- The resolution shown is a calculated number based upon the capstan diameter, wire rope diameter and line count of the encoding device. The tolerance on the resolution accounts for resolutional differences from unit to unit due to manufacturing tolerances on the capstan and wire rope. In practice, the output count in a given unit of travel is an integer.

### MODEL NUMBER CONFIGURATION

**HX-EP-** 0 1 2 3 4 5 7 8 9

**0 RANGE**  
 Select Measurement Range From Supplemental Data **Table 12** (next page), Insert Corresponding Measurement Range Designator

**1 WIRE ROPE**  
**S** ..... Stainless Steel (See Supplemental Data, Table 12)  
**N** ..... 0.018 (0,45 mm) Nylon Jacketed Stainless Steel Ranges to 80" (2m) only. (formerly NJC)  
**J** ..... 0.037 (0,94 mm) Nylon Jacketed Stainless Steel Ranges 100" (2.5m) to 500" (12.7m) only.

**2 WIRE ROPE TENSION**  
**1** ..... Standard  
**2** ..... Reduced (Ranges to 80" only)

**3 WIRE ROPE EXIT DIRECTION**  
 Use Number designators shown RANGES TO 80" (2000 mm)

RANGES 100" TO 2000" (2.5 m TO 50 M)

**4 N** ..... Required Designator

**5 ELECTRICAL OUTPUT**  
**10** ..... 5 VDC TTL Compatible, Two Channel  
**30** ..... 5 VDC Push-Pull Differential Line Drive  
**50** ..... 8 to 28 VDC Current Sinking Two Channel  
**70** ..... 8 to 28 VDC Push-Pull Differential Line Drive  
 For Description See **TABLE 8** on next page

#### 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.

### BASIC CONFIGURATION (FOR ALL RANGES)

**HX-EP-50-S10-N10-1BC**

**7 INGRESS PROTECTION**  
**1** ..... IP-65 (NEMA 4)  
**2** ..... IP-68 (NEMA 6)  
**3** ..... IP-68 (NEMA 6) Corrosion Resistant Construction

**8 IP-65-NEMA 4 CONNECTOR**  
**B** ..... 6 Pin 3102E Body Mounted Connector  
**IP-68-NEMA 6 ELECTRICAL CABLE**  
**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

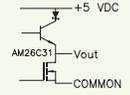
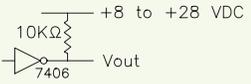
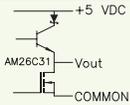
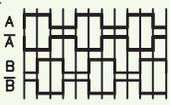
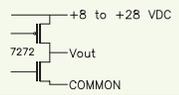
**9 IP-65-NEMA 4 MATING CONNECTOR**  
**C** ..... IP-65 Mating Connector Included  
**K** ..... IP-65 Mating Connector Omitted\*  
 \*Electrical cable with mating connector may be ordered separately as part number **10119-xM** where 'x' is the length required in meters.

**IP-68-NEMA 6 CABLE MOUNTED CONNECTOR**  
**N** ..... No connector on end of electrical cable  
**K** ..... IP-68 Cable to cable connector with **NJC** 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.

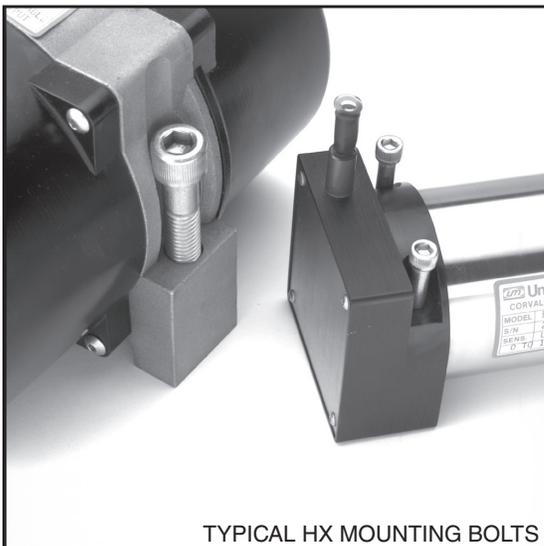
**ADDITIONAL OPTIONS**

**TABLE 8**

**EP, HX-EP SERIES OPTIONAL ELECTRICAL OUTPUTS**

OPTION	OUTPUT DESCRIPTION	OUTPUT STAGE	WAVEFORM	CONNECTOR WIRING												
10	<b>5 VDC Current Sinking</b> 5 VDC TTL compatible output. Input Voltage: 5 VDC.			<table border="1" data-bbox="1299 619 1453 766"> <tr><td>A</td><td>+Vin</td></tr> <tr><td>B</td><td>COMMON</td></tr> <tr><td>C</td><td>CHANNEL A</td></tr> <tr><td>D</td><td>CHANNEL B</td></tr> <tr><td>E</td><td></td></tr> <tr><td>F</td><td></td></tr> </table>	A	+Vin	B	COMMON	C	CHANNEL A	D	CHANNEL B	E		F	
A	+Vin															
B	COMMON															
C	CHANNEL A															
D	CHANNEL B															
E																
F																
50	<b>8 to 28 VDC Current Sinking</b> Current sinking output with 10KΩ internal pullup resistors. Input Voltage: 8 to 28 VDC.															
30	<b>5 VDC Push-Pull Differential Line Drive</b> Push-Pull, current sourcing and current sinking output. Output is compliant with requirements of TIA/EIA-422-B. Input Voltage: 5 VDC input.			<table border="1" data-bbox="1299 829 1453 976"> <tr><td>A</td><td>+Vin</td></tr> <tr><td>B</td><td>COMMON</td></tr> <tr><td>C</td><td>CHANNEL A</td></tr> <tr><td>D</td><td>CHANNEL A</td></tr> <tr><td>E</td><td>CHANNEL B</td></tr> <tr><td>F</td><td>CHANNEL B</td></tr> </table>	A	+Vin	B	COMMON	C	CHANNEL A	D	CHANNEL A	E	CHANNEL B	F	CHANNEL B
A	+Vin															
B	COMMON															
C	CHANNEL A															
D	CHANNEL A															
E	CHANNEL B															
F	CHANNEL B															
70	<b>8 to 28 VDC Push-Pull Differential Line Drive</b> Push-Pull, current sourcing and current sinking output. Input Voltage: 8 to 28 VDC.															

**MECHANICAL SPECIFICATIONS**



**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.

**ADDITIONAL OPTIONS**

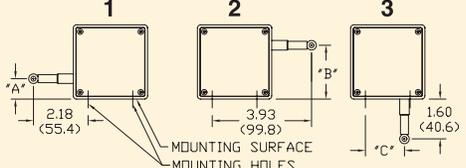
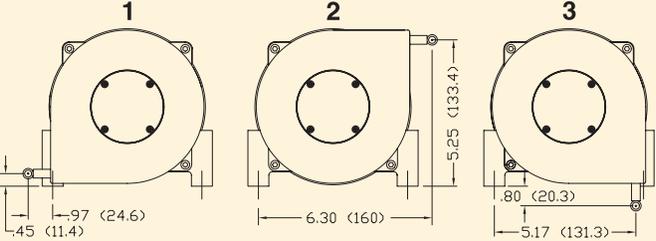
Use value from this column to indicate overall measurement range

Check mark indicates available measurement range

**TABLE 12**

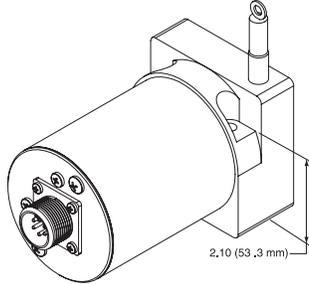
MEASUREMENT RANGE DESIGNATOR	STANDARD MEASUREMENT RANGES		APPLICABLE SERIES			WIRE ROPE TENSION (NOMINAL)		WIRE ROPE DIAMETER		TRANSDUCER WEIGHT		Product Photo
	(in)	(mm)	HX-PA HX-PB HX-P420 HX-P510	HX-EP	HX-V HX-VP	(oz)	(N)	(in)	(mm)	(lb)	(Kg)	
2	2	50	✓	-	✓	34	9.4	.016	0.4	2	0.9	
3	3	75	✓	-	✓	24	6.7	.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>	 <table border="1"> <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><i>Dimensions in brackets are millimeters</i></p>	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)
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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>	 <p><i>Dimensions in brackets are millimeters</i></p>																												
<b>NON-STANDARD POTENTIOMETER</b> <u>APPLIES TO HX-PA &amp; HX-VPA ONLY</u>	<b>3, 4</b>	<p>Non-standard potentiometer linearity is as follows:</p> <table border="1"> <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																				
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<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>	 <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>																												
<b>CORROSION RESISTANT CONSTRUCTION</b>	<b>3</b>	<p>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.</p> 																												

**DIMENSIONAL INFORMATION**

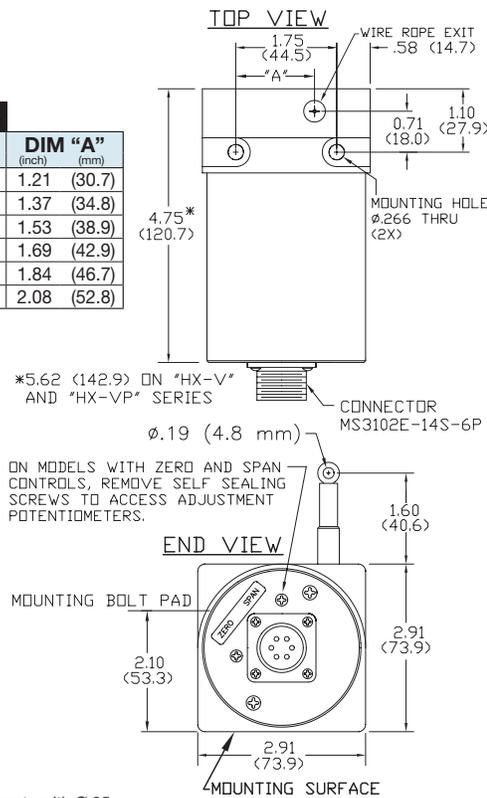
**HX SERIES – RANGES TO 80" (2 m)**



**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

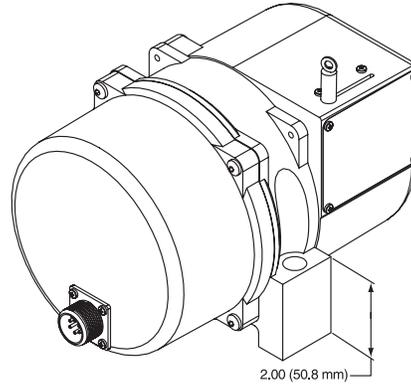
**TABLE 14**

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 x E where E = extension in inches. For "C" in millimeters, C = .0016 x E where E = extension in mm.

Dimensions in brackets are millimeters

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



**Fig. 2**

