



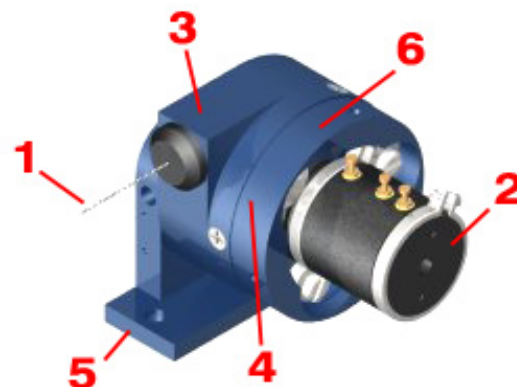
Data Sheet - Series 160, 161 and 162 Miniature Position Transducers

Analog-Output Miniature Position Transducers

Shaded characteristics are verified during production and test. All others are for REFERENCE and information only.

Key Features

- 42.5-Inch (1080-mm) Maximum Travel (Series 162)
- Analog Signal Using Precision Conductive Plastic/Hybrid Potentiometers
- AccuTrak™ Threaded Drum for Enhanced Repeatability
- Bearing-Mounted Rotating Components
- Optional Flexible Mounting Bases
- DirectConnect™ Sensor-To-Drum Technology = Zero Backlash, No Torsion Springs or Clutches



Potentiometer Specifications

	<i>1-turn</i>	<i>3-turn</i>	<i>5-turn</i>
Potentiometer Type	1-turn, precision, conductive plastic	3-turn, precision, hybrid	5-turn, precision, hybrid
Resistance: Value, Tolerance	5K ohms, $\pm 20\%$	5K ohms, $\pm 5\%$	5K ohms, $\pm 5\%$
Travel: Electrical, Mechanical	340°, 360°	1080°, 1080° +10° -0°	1800°, 1800° +10° -0°
Mechanical Life	10 million shaft revolutions min	5 million shaft revolutions min	5 million shaft revolutions min
Output Signal	analog signal from 0 to supply voltage (voltage divider circuit)		
Power Rating	1.0 W at 158° F (70° C)	1.5 W at 158° F (70° C)	2.0 W at 158° F (70° C)
Supply Current	12 mA max		
Supply Voltage	35 VDC max (using voltage divider circuit)		
Independent Linearity Error	$\pm 1.0\%$ max per VRCI-P-100A	$\pm 0.5\%$ max per VRCI-P-100A	$\pm 0.35\%$ max per VRCI-P-100A
Output Smoothness	0.1% max	0.5% max	0.35% max
Insulation Resistance	100 Mohms at 1000 VDC min	1000 Mohms at 500 VDC min	1000 Mohms at 500 VDC min
Dielectric Strength	1000 VDC min	1000 VDC min	1000 VDC min
Resolution	infinite signal	infinite signal	infinite signal

Operating Temperature	-40° to 257° F (-40° to 125° C)	-67° to 257° F (-55° to 125° C)	-67° to 257° F (-55° to 125° C)
Electrical Connection	3-terminal (1, 2, 3)	3-terminal (CW,CCW,S)	3-terminal (CW,CCW,S)
Shock	50 g for 11 ms	100 g for 6 ms	100 g for 6 ms
Vibration	10 to 2000 Hz at 15 g	10 to 2000 Hz at 15 g	10 to 2000 Hz at 15 g
Temperature Coefficient	±400 ppm/°C max	±0.007%/°C max	±0.007%/°C max

The potentiometer type of a specific position transducer part number is designated by the 8th digit of the part number counting left to right. Example: 160-0321-C5SS contains a 1-turn potentiometer while 161-2405-D7NU contains a 5-turn potentiometer.

Other Specifications

Case/Drum Materials	precision-machined anodized 2024 aluminum					
Displacement Cable	0.018-inch (0.46-mm) dia., 7-by-7 stranded stainless steel, 40-lb (177-N) min breaking strength					
Displacement Cable Hardware	1 each of 300196 loop sleeve , 300292 copper sleeve , 300688 ball-end plug , 300495 pull ring , 160026 brass swivel , and 301003 nickel swivel ; all items provided uncrimped					
Electrical Connections	three solder terminals; electrical cable and connector options available					
Nominal Mass	Series 160		Series 161		Series 162	
	4 oz	113 g	6.1 oz	170 g	9 oz	255 g
Environmental Protection	NEMA 4 / IP 56, DO-160D (ED-14D) Env. Cat. E1E1ABXHRFDFSAXXXXXXXXXXX (with optional sensor cover)					

Model Numbers and Ordering Codes

Model	Range		Nominal Displacement Cable Tension Range (Full Retraction to Full Extraction)							
	inches	mm	Opt 5: -050 spring		Opt 6: -060 spring		Opt 7: -070 spring		Opt 8: -080 spring	
			oz.	N	oz.	N	oz.	N	oz.	N
160-0161	2.00	51	9 to 15	3 to 4	16 to 25	4 to 7	30 to 37	8 to 10	40 to 55	11 to 15
160-0241	3.00	76	7 to 12	2 to 3	10 to 18	3 to 5	17 to 30	5 to 8	40 to 55	11 to 15
160-0321	4.00	102	4 to 8	1 to 2	5 to 12	1 to 4	12 to 20	3 to 6	28 to 55	7 to 16
160-0483	6.00	152	10 to 21	3 to 6	12 to 30	3 to 8	48 to 72	13 to 20	75 to 160	21 to 45
160-0643	8.00	203	7 to 17	2 to 5	9 to 24	3 to 7	22 to 38	6 to 11	40 to 120	11 to 33
160-0803	10.00	254	6 to 13	2 to 4	8 to 19	2 to 5	16 to 32	4 to 9	35 to 100	10 to 28
160-0963	12.00	305	5 to 11	1 to 3	7 to 19	2 to 5	14 to 27	4 to 8	24 to 82	7 to 23
160-1085	13.50	343	7 to 20	2 to 6	12 to 28	3 to 8	18 to 53	5 to 15	30 to 134	8 to 37
160-1285	16.00	406	6 to 17	2 to 5	8 to 24	2 to 7	19 to 40	5 to 11	17 to 102	5 to 28
160-1505	18.75	476	5 to 14	1 to 4	8 to 22	2 to 6	15 to 39	4 to 11	24 to 90	6 to 26
160-1705	21.25	540	5 to 12	1 to 3	7 to 19	2 to 5	12 to 33	3 to 9	14 to 79	4 to 22
161-0461	5.75	146	-	-	4 to 15	1 to 4	13 to 32	4 to 9	35 to 50	10 to 14
161-1283	16.00	406	-	-	6 to 12	2 to 3	10 to 25	3 to 7	14 to 70	4 to 19
161-1915	23.88	606	-	-	5 to 17	1 to 5	13 to 30	4 to 8	16 to 80	4 to 22
161-2145	26.75	679	-	-	7 to 14	2 to 4	10 to 25	3 to 7	11 to 60	3 to 17

161-2405	30.00	762	-	-	5 to 12	1 to 3	8 to 23	2 to 6	9 to 60	3 to 17
162-2735	34.13	867	-	-	-	-	8 to 21	2 to 6	10 to 55	3 to 15
162-2945	36.75	933	-	-	-	-	7 to 20	2 to 6	15 to 44	4 to 12
162-3205	40.00	1016	-	-	-	-	7 to 18	3 to 5	10 to 43	3 to 12
162-3405	42.50	1080	-	-	-	-	7 to 17	2 to 5	8 to 41	2 to 11

Bolded entries are standard cable tension.

Order Codes

16-_-_-_-abcd (example: 160-0321-S5SB (cable exit: slot, cable tension: -050, sensor cover, and base: big foot))

Series 160	a	S	cable exit: slot (_60)
		C	cable exit: cable guide
		D	cable exit: idler (_60); pn 160022
		R	cable exit: RoundAbout™; pn 301224
	b	5	cable tension: -050
		6	cable tension: -060
		7	cable tension: -070
		8	cable tension: -080
	c	N	no sensor cover (_60)
		S	sensor cover (_60); pn 160060
	d	D	base: mounting disk (_6_); pn 160040-1 (cannot be ordered with a = R (cannot be used with RoundAbout™ cable exit))
		S	base: standard (_60); pn 160015-1
		U	base: universal (_60); pn 160030-1
		B	base: big foot (_60/_61); pn 160015-1
		H	base: h (_60); pn 160015-G1
		P	base: universal (miniature) (_60); pn 300460

Series 161	a	S	cable exit: slot (_61)
		C	cable exit: cable guide
		D	cable exit: idler (_61/_62); pn 161022
		R	cable exit: RoundAbout™; pn 301224
	b	5	cable tension: -050
		6	cable tension: -060
		7	cable tension: -070
		8	cable tension: -080
	c	N	no sensor cover (_61)
		S	sensor cover (_61); pn 160060
	d	D	base: mounting disk (_6_); pn 160040-1 (cannot be ordered with a = R (cannot be used with RoundAbout™ cable exit))
		S	base: standard (_61); pn 160015-3
		U	base: universal (_61); pn 160030-3

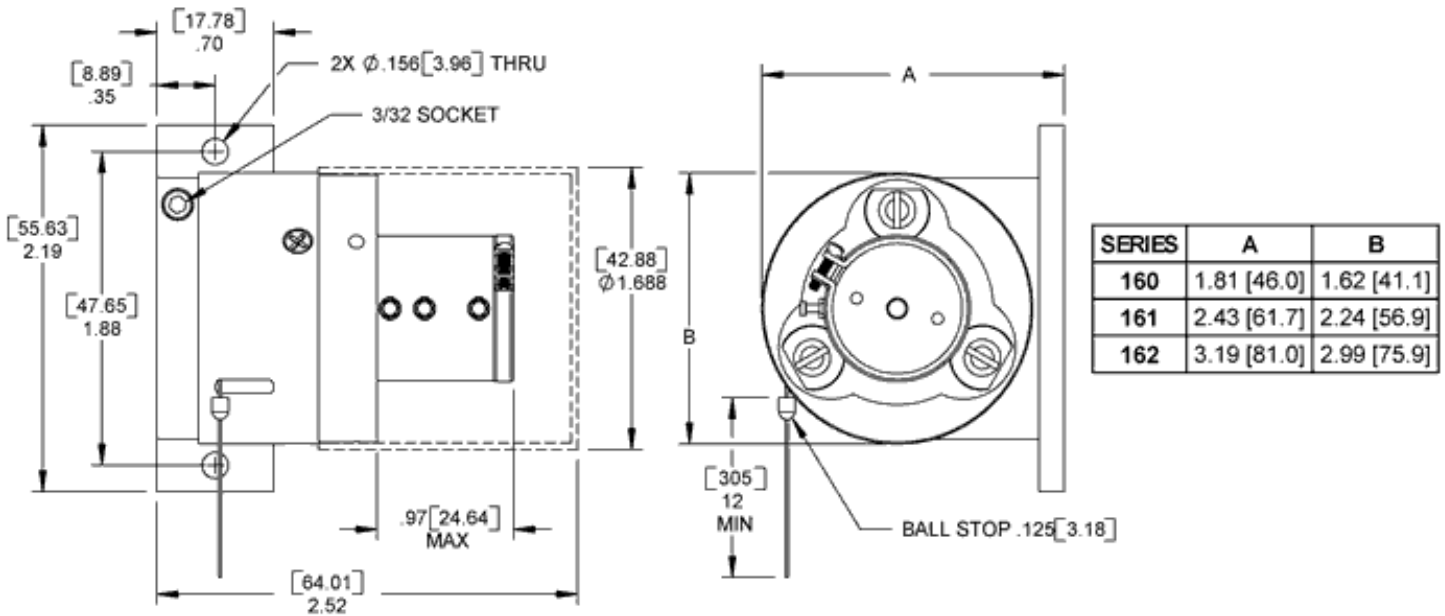
B base: big foot (_60/_61); pn [160015-1](#)

Series 162	a	S	cable exit: slot (_62)
		C	cable exit: cable guide
		D	cable exit: idler (_61/_62); pn 161022
		R	cable exit: RoundAbout™; pn 301224
	b	5	cable tension: -050
		6	cable tension: -060
		7	cable tension: -070
		8	cable tension: -080
	c	N	no sensor cover (_62)
		S	sensor cover (_62); pn 160060
	d	D	base: mounting disk (_6_); pn 160040-1 (cannot be ordered with a = R (cannot be used with RoundAbout™ cable exit))
		S	base: standard (_62); pn 160015-
		U	base: universal (_62); pn 160030-
		B	base: big foot (_62); pn 160015-1

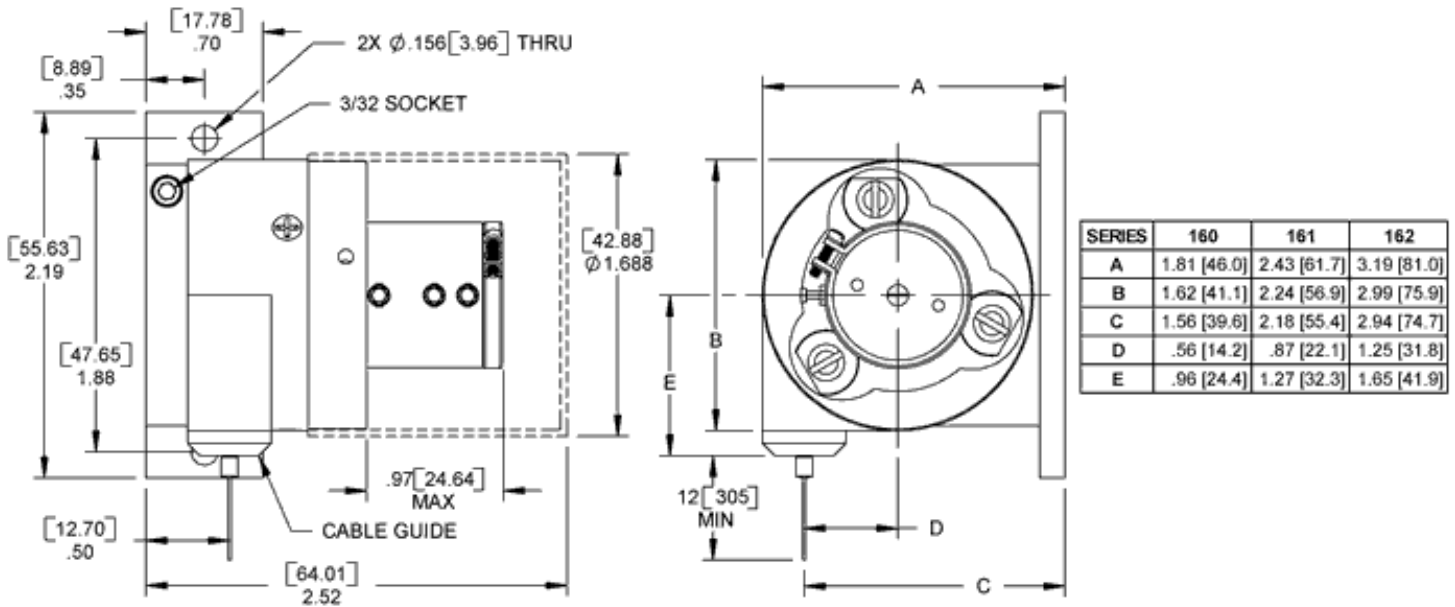
Displacement Cable Maximum Acceleration by Model Number

Model	Max Cable Acceleration (g's)			
	Opt 5: -050 spring	Opt 6: -060 spring	Opt 7: -070 spring	Opt 8: -080 spring
160-0161	10	19	35	46
160-0241	14	22	123	82
160-0321	8	10	23	69
160-0483	38	54	173	357
160-0643	43	55	147	427
160-0803	38	64	121	242
160-0963	30	42	103	182
160-1085	55	65	109	165
160-1285	42	47	99	105
160-1505	16	49	98	127
160-1705	30	40	75	70
161-0461	5	8	16	23
161-1283	-	38	76	126
161-1915	-	72	133	205
161-2145	-	70	130	201
161-2405	-	56	72	95
162-2735	-	-	60	84
162-2945	-	-	48	73
162-3205	-	-	37	63
162-3405	-	-	31	45

Drawing: shown with *slot cable exit*, standard base, and optional sensor cover.

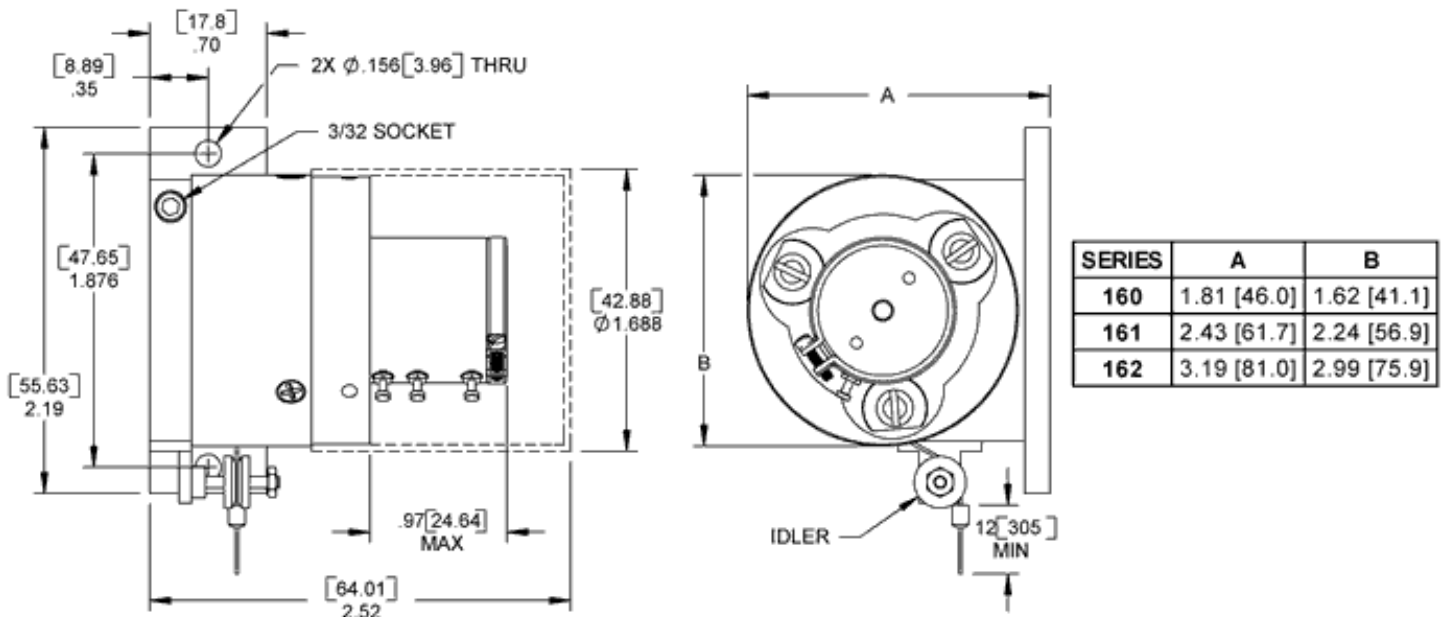


Drawing: shown with *cable guide cable exit*, standard base, and optional sensor cover.

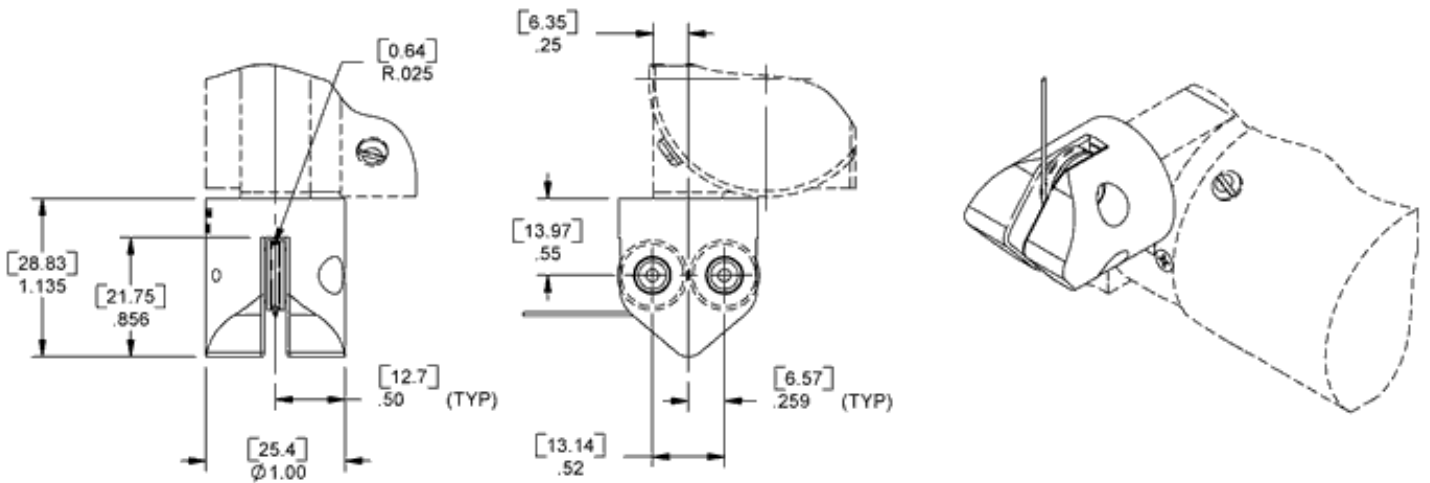


Drawing: shown with *idler cable exit*, standard base, and optional sensor cover.

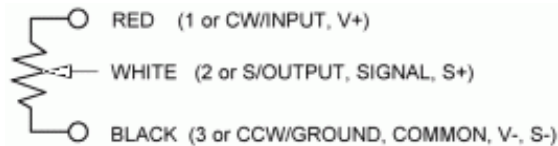
Idler cable exit will reduce displacement cable life and may reduce maximum range by up to 0.75 inch (19.1 mm). Idler not recommended for use with -080 spring.



Drawing: RoundAbout™ cable guide dimensional details



Electrical Schematic



For crimping of hardware to displacement cable, consider the [160001-01 installation kit](#).

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All dimensions are REFERENCE and are in inches [mm] Data Sheet Series 160, 161 and 162 Rev. -

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An ISO9001:2000/AS9100B-Compliant Company
1176 Telecom Drive • Creedmoor, NC 27522 USA
Phone: 1-919-956-4203 • Fax: 919-682-3786 • Toll Free: 1-866-912-6232

Business hours: Mon-Fri, 8:00am to 5:00pm (Eastern time)

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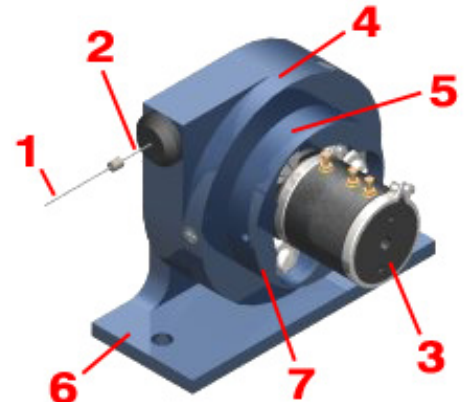
Data Sheet - Series 161H and 162H Miniature Position Transducers with High Cable Tension

Analog-Output Miniature Position Transducers

Shaded characteristics are verified during production and test. All others are for REFERENCE and information only.

Key Features

1. High Cable Tension for Enhanced Frequency Response
2. 42.5-Inch (1080-mm) Maximum Travel (Series 162)
3. Analog Signal Using Precision Conductive Plastic or Hybrid Potentiometers
4. AccuTrak™ Threaded Drum for Enhanced Repeatability
5. Bearing-Mounted Rotating Components
6. Optional Flexible Mounting Bases
7. DirectConnect™ Sensor-To-Drum Technology = Zero Backlash, No Torsion Springs or Clutches



Potentiometer Specifications

	1-turn	3-turn	5-turn
Potentiometer Type	1-turn, precision, conductive plastic	3-turn, precision, hybrid	5-turn, precision, hybrid
Resistance: Value, Tolerance	5K ohms, $\pm 20\%$	5K ohms, $\pm 5\%$	5K ohms, $\pm 5\%$
Travel: Electrical, Mechanical	340°, 360°	1080°, 1080° +10° -0°	1800°, 1800° +10° -0°
Mechanical Life	10 million shaft revolutions min	5 million shaft revolutions min	5 million shaft revolutions min
Output Signal	analog signal from 0 to supply voltage (voltage divider circuit)		
Power Rating	1.0 W at 158° F (70° C)	1.5 W at 158° F (70° C)	2.0 W at 158° F (70° C)
Supply Current	12 mA max		
Supply Voltage	35 VDC max (using voltage divider circuit)		
Independent Linearity Error	$\pm 1.0\%$ max per VRCI-P-100A	$\pm 0.5\%$ max per VRCI-P-100A	$\pm 0.35\%$ max per VRCI-P-100A
Output Smoothness	< 0.1% max	0.5% max	0.35% max
Insulation Resistance	100 Mohms at 1000 VDC min	1000 Mohms at 500 VDC min	1000 Mohms at 500 VDC min
Dielectric Strength	1000 VDC min	1000 VDC min	1000 VDC min

Resolution	infinite signal	infinite signal	infinite signal
Operating Temperature	-40° to 257° F (-40° to 125° C)	-67° to 257° F (-55° to 125° C)	-67° to 257° F (-55° to 125° C)
Electrical Connection	3-terminal (1, 2, 3)	3-terminal (CW,CCW,S)	3-terminal (CW,CCW,S)
Shock	50 g for 11 ms	100 g for 6 ms	100 g for 6 ms
Vibration	10 to 2000 Hz at 15 g	10 to 2000 Hz at 15 g	10 to 2000 Hz at 15 g
Temperature Coefficient	±400 ppm/°C max	±0.007%/°C max	±0.007%/°C max

The potentiometer type of a specific position transducer part number is designated by the 8th digit of the part number counting left to right. Example: 161-0361H-AND contains a 1-turn potentiometer while 162-3405H-BSD contains a 5-turn potentiometer.

Other Specifications

Case/Drum Materials	precision-machined anodized 2024 aluminum						
Displacement Cable	0.027-inch (0.69-mm) dia., 7-by-7 stranded stainless steel, 90-lb (400-N) min breaking strength						
Displacement Cable Hardware	1 each of 300196 loop sleeve , 300292 copper sleeve , 160032 copper sleeve , 300688 ball-end plug , 300495 pull ring , and 301003 nickel swivel ; all items provided uncrimped						
Electrical Connections	three solder terminals; electrical cable and connector options available						
Nominal Mass	<table style="width:100%; border:none;"> <tr> <td style="width:50%; text-align:center;">Series 161H</td> <td style="width:50%; text-align:center;">Series 162H</td> </tr> <tr> <td style="text-align:center;">7 oz</td> <td style="text-align:center;">10 oz</td> </tr> <tr> <td style="text-align:center;">198 g</td> <td style="text-align:center;">284 g</td> </tr> </table>	Series 161H	Series 162H	7 oz	10 oz	198 g	284 g
Series 161H	Series 162H						
7 oz	10 oz						
198 g	284 g						
Environmental Protection	NEMA 4 / IP 56, DO-160D (ED-14D) Env. Cat. E1E1ABXHRFDFSAXXXXXXXXXXX (with optional sensor cover)						

Model Numbers and Ordering Codes

Model	Range		Nominal Displacement Cable Tension Range (Full Extraction to Full Retraction)			
	inches	mm	Opt A: -090 spring		Opt B: -100 spring	
			oz.	N	oz.	N
161-0361H	4.50	114	65 to 95	18 to 26	79 to 170	22 to 47
161-0461H	5.75	146	65 to 95	18 to 26	70 to 150	19 to 42
161-1143H	14.25	362	75 to 180	21 to 50	75 to 300	21 to 83
161-1283H	16.00	406	50 to 130	14 to 36	75 to 200	21 to 56
161-1443H	18.00	457	35 to 150	10 to 42	70 to 130	19 to 36
161-1915H	23.88	606	45 to 215	13 to 60	50 to 245	14 to 68
161-2145H	26.75	679	40 to 190	11 to 53	65 to 240	18 to 67
161-2405H	30.00	762	30 to 160	8 to 44	50 to 260	14 to 72
162-0521H	6.50	165	55 to 85	15 to 24	105 to 135	29 to 38
162-0651H	8.13	206	75 to 120	21 to 33	105 to 135	29 to 38
162-2735H	34.13	867	40 to 140	11 to 39	75 to 160	8 to 44
162-2945H	36.75	933	56 to 130	16 to 36	75 to 160	8 to 44
162-3205H	40.00	1016	25 to 120	7 to 33	35 to 175	10 to 49
162-3405H	42.50	1080	10 to 105	3 to 29	30 to 145	8 to 40

Bolded entries are standard cable tension.

Order Codes

16_ _ _ _ H-abc (example: 161-0361H-BSB (cable tension: -100, sensor cover, and base: big foot))

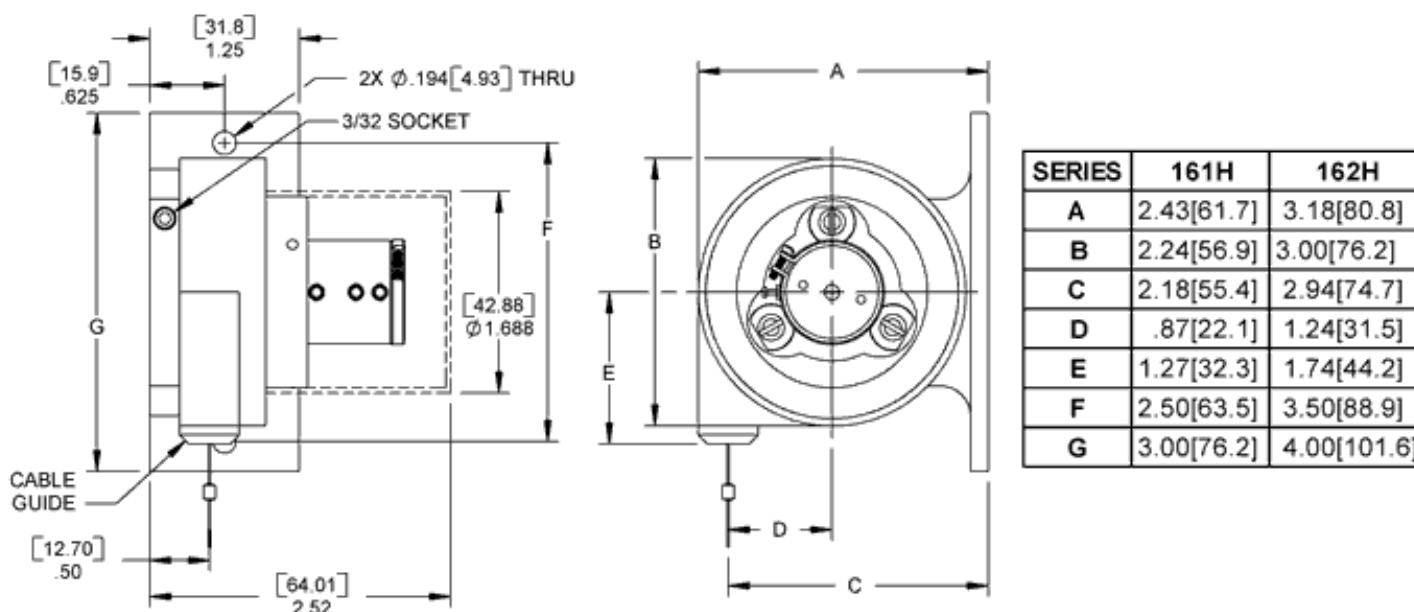
Series 161H	a	A	cable tension: -090
		B	cable tension: -100
	b	N	no sensor cover (_61)
		S	sensor cover (_61); pn 160060
	c	D	base: mounting disk (_6_); pn 160040-1
		S	base: standard (_61); pn 160015-3
		U	base: universal (_61); pn 160030-3
		B	base: big foot (_60/_61); pn 160015-13

Series 162H	a	A	cable tension: -090
		B	cable tension: -100
	b	N	no sensor cover (_62)
		S	sensor cover (_62); pn 160060
	c	D	base: mounting disk (_6_); pn 160040-1
		S	base: standard (_62); pn 160015-5
		U	base: universal (_62); pn 160030-5
		B	base: big foot (_62); pn 160015-15

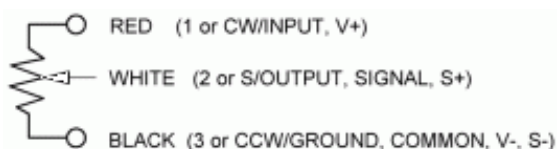
Displacement Cable Maximum Acceleration by Model Number

Model	Max Cable Acceleration (g)	
	Opt A: -090 spring	Opt B: -100 spring
161-0361H	100+	100+
161-0461H	100+	100+
161-1143H	337	100+
161-1283H	346	100+
161-1443H	215	100+
161-1915H	256	512
161-2145H	401	1354
161-2405H	100+	397
162-0521H	100+	100+
162-0651H	83	109
162-2735H	100+	100+
162-2945H	100+	100+
162-3205H	157	184
162-3405H	100+	100+

Drawing



Shown with big foot base (pn 160015-13).



For crimping of hardware to displacement cable, consider the [160001-01 installation kit](#). Need something not shown? Complete a [Custom Solution Request](#).

All dimensions are REFERENCE and are in inches [mm] Data Sheet Series 161H and 162H Rev. A

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 1176 Telecom Drive • Creedmoor, NC 27522 USA
 Phone: 1-919-956-4203 • Fax: 919-682-3786 • Toll Free: 1-866-912-6232

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