



HCA & HCA-RA SERIES

Hermetically Sealed AC LVDT

SPECIFICATIONS

- Hermetically sealed, all welded
- Stainless steel housing
- MS type connector, glass sealed
- Axial or radial electrical connection
- IEC IP68 rating to 1,000 PSI [70 bars]
- Stroke ranges from ± 0.05 to ± 10 inches
- AC operation from 400Hz to 10kHz
- Double magnetic shielding
- Through bore design (HCA-RA version)

The **HCA and HCA-RA Series** hermetically sealed LVDTs provide premium performance in harsh industrial environments. Impervious to dirt, water, steam, and corrosive liquids/vapors compatible with its materials, the HCA/HCA-RA all-welded stainless steel construction withstands external pressures up to 1,000 PSI [70 bars]. Double magnetic shielding offers excellent protection from external electromagnetic fields.

The HCA/HCA-RA Series can be configured with a number of standard options. A high temperature operation (200°C) model, HCA-T is also available. The HCA/HCA-RA is compatible with the full line of Measurement Specialties LVDT signal conditioners.

The HCA-RA version adds the convenience of a radial connector termination. This feature decreases the required installation space, while also allowing debris to harmlessly pass through the 'open-ended' bore.

Like in most of our LVDTs, the HCA/HCA-RA windings are vacuum impregnated with a specially formulated, high temperature, flexible resin, and the coil assembly is potted inside its housing with a two-component epoxy. This provides excellent protection against hostile environments such as high vibration and shock.

Captive core option: The HCA/HCA-RA features an optional captive core design that greatly simplifies installation. The core rod and bearing assembly includes a Bronze bearing on the front end for self-alignment, while a PTFE sleeve allows low-friction travel through the stainless steel boreliner (spool tube). The core rod and the bearing assembly are both field serviceable.

Also see our other hermetically sealed LVDT models with built-in signal conditioning: **HCD** (DC voltage), **HCT** (4-20mA, 2-wire loop) and **HC-485** (RS-485 Digital Series).

FEATURES

- All-welded stainless steel construction
- Glass sealed, MS type connector (MIL-C-5015)
- Shock and vibration tolerant
- Captive core eases installation (optional)
- High temperature version available (200°C)
- Calibration certificate supplied with each unit
- Right angle (HCA-RA) version available

APPLICATIONS

- Harsh industrial environments
- Submersible (with appropriate connector)
- Pressure vessels
- Corrosive liquid and vapor areas (check materials)
- Mild radiation areas
- Turbine valve

PERFORMANCE SPECIFICATIONS

| ELECTRICAL SPECIFICATIONS | | | | | | | | | | |
|------------------------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| Parameter | HCA HCA-RA 050 | HCA HCA-RA 125 | HCA HCA-RA 250 | HCA HCA-RA 500 | HCA HCA-RA 1000 | HCA HCA-RA 2000 | HCA HCA-RA 3000 | HCA HCA-RA 4000 | HCA HCA-RA 5000 | HCA HCA-RA 10000 |
| Stroke range | ±0.050 [±1.27] | ±0.125 [±3.17] | ±0.25 [±6.35] | ±0.5 [±12.7] | ±1 [±25.4] | ±2 [±50.8] | ±3 [±76.2] | ±4 [±101.6] | ±5 [±127] | ±10 [±254] |
| Sensitivity V/V/inch mV/V/mm | 4.2 [165] | 2.4 [94.5] | 1.6 [63.0] | 1.1 [43.3] | 0.84 [33.1] | 0.32 [12.6] | 0.20 [7.9] | 0.18 [4.6] | 0.16 [6.3] | 0.13 [5.1] |
| Output at stroke ends, mV/V (*) | 210 | 300 | 400 | 550 | 840 | 640 | 600 | 720 | 800 | 1,300 |
| Phase shift | +6° | +5° | +5° | +2° | +1° | -1° | +1° | +3° | -5° | -6° |
| Input impedance (PRIMARY) | 430Ω | 1710Ω | 800Ω | 900Ω | 900Ω | 525Ω | 930Ω | 1000Ω | 1200Ω | 930Ω |
| Output impedance (SECONDARY) | 950Ω | 1820Ω | 940Ω | 1150Ω | 2100Ω | 535Ω | 1040Ω | 580Ω | 1640Ω | 3000Ω |
| Non-linearity | ±% of FR | | | | | | | | | |
| @100% stroke (maximum) | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| @125% stroke | 0.25 | 0.25 | 0.30 | 0.30 | 0.35 | 0.40 (**) | 0.50 | / | 0.80 | 0.90 (**) |
| @150% stroke | 0.50 | 0.50 | 0.50 | 0.55 (**) | 0.55 (**) | 0.70 (**) | 1.00 (**) | / | / | / |
| Input voltage | 3 VRMS sine wave | | | | | | | | | |
| Input frequency | 400Hz to 10kHz | | | | | | | | | |
| Test frequency | 2.5kHz | | | | | | | | | |
| Null voltage | 0.5% of FRO, maximum | | | | | | | | | |

| ENVIRONMENTAL SPECIFICATIONS & MATERIALS | |
|--|--|
| Operating temperature | -65°F to +300°F [-55°C to 150°C] |
| Shock survival | 1,000 g (11ms half-sine) |
| Vibration tolerance | 20 g up to 2kHz |
| Housing material | AISI 400 Series stainless steel |
| Electrical connector | 6-pin MS type connector (MIL-C-5015) |
| IEC 60529 rating | IP68 to 1,000 PSI [70 bars] with use of proper mating connector plug |

Notes

All values are nominal unless otherwise noted

Electrical specifications are for the test frequency indicated in the table

Dimensions are in inch [mm] unless otherwise noted

FR: Full Range is the stroke range, end to end; FR=2xS for ±S stroke range

FRO (Full Range Output): Algebraic difference in outputs measured at the ends of the range

(*) Unit for output at stroke ends is millivolt per volt of excitation (input voltage)

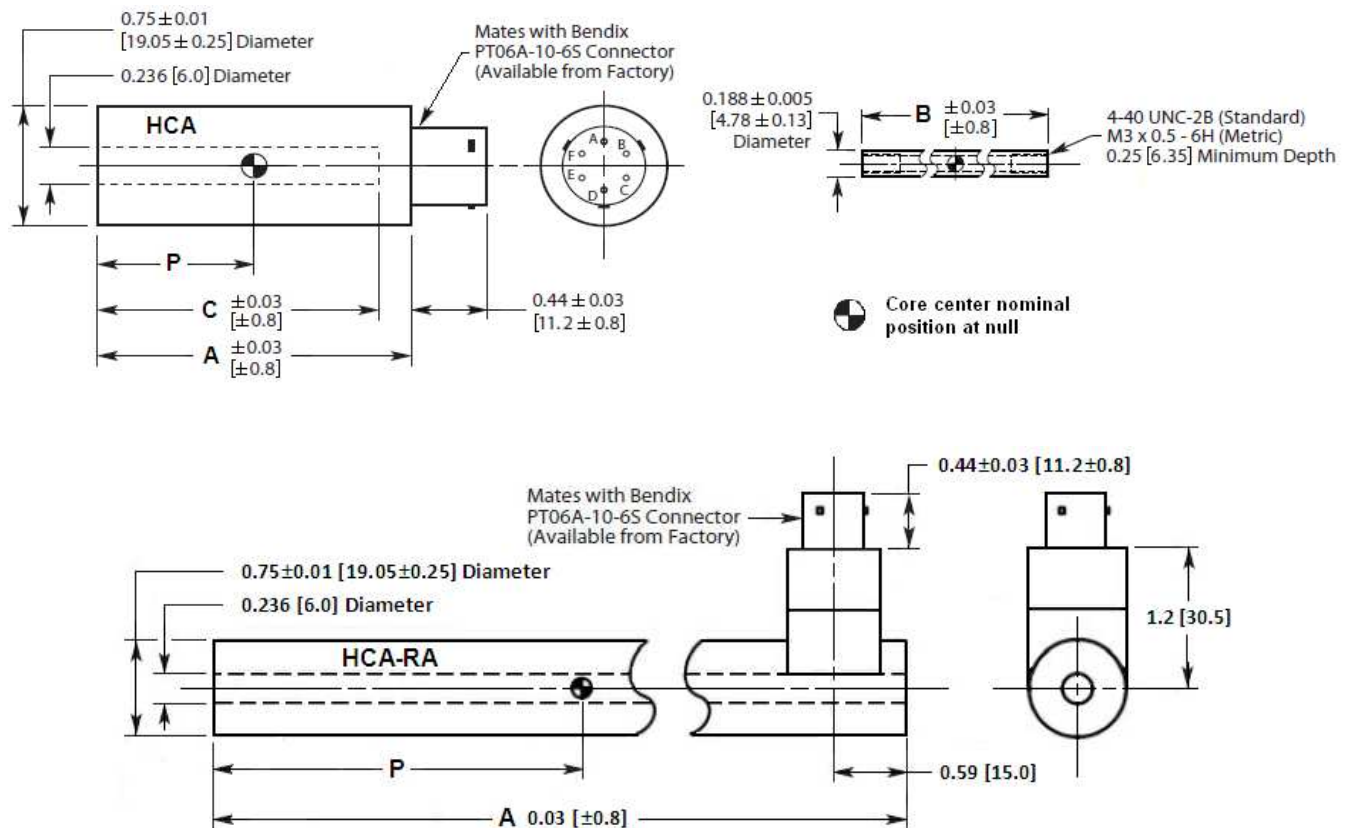
(**) Requires special reduced core length

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MECHANICAL SPECIFICATIONS – NON CAPTIVE CORE (STANDARD)

| Parameter | HCA HCA-RA 050 | HCA HCA-RA 125 | HCA HCA-RA 250 | HCA HCA-RA 500 | HCA HCA-RA 1000 | HCA HCA-RA 2000 | HCA HCA-RA 3000 | HCA HCA-RA 4000 | HCA HCA-RA 5000 | HCA HCA-RA 10000 |
|-------------------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| Body length "A" | 1.66 [42.2] | 2.50 [63.5] | 3.36 [85.3] | 5.05 [128.3] | 7.29 [185.2] | 10.68 [271.3] | 15.76 [400.3] | 16.17 [410.7] | 19.70 [500.4] | 33.82 [859.0] |
| Core length "B" | 0.59 [15.0] | 1.10 [27.9] | 1.80 [45.7] | 3.00 [76.2] | 3.80 [96.5] | 5.30 [134.6] | 6.20 [157.5] | 6.20 [157.5] | 6.20 [157.5] | 12.00 [304.8] |
| Bore depth "C" HCA only | 1.07 [27.2] | 1.91 [48.5] | 2.77 [70.4] | 4.46 [113.3] | 6.72 [170.7] | 10.20 [259.1] | 15.17 [385.3] | | 19.12 [485.6] | 33.23 [844.0] |
| Core center at null "P" | 0.55 [14.0] | 0.96 [24.4] | 1.39 [35.3] | 2.23 [56.6] | 3.32 [84.3] | 4.91 [124.7] | 7.59 [192.8] | 7.87 [199.9] | 9.56 [242.8] | 16.61 [421.9] |
| HCA body weight oz [g] | 1.20 [34] | 1.73 [49] | 2.22 [63] | 2.93 [83] | 5.22 [148] | 5.65 [160] | 8.33 [236] | 8.50 [241] | 10.31 [292] | 18.57 [526] |
| HCA-RA body weight, oz [g] | 2.26 [64] | 2.79 [79] | 3.28 [93] | 3.98 [113] | 6.28 [178] | 6.70 [190] | 9.38 [266] | 9.60 [272] | 11.35 [322] | 19.61 [556] |
| Core weight oz [g] | 0.07 [2] | 0.11 [3] | 0.14 [4] | 0.28 [8] | 0.39 [11] | 0.46 [13] | 0.60 [17] | 0.60 [17] | 0.60 [17] | 0.85 [24] |



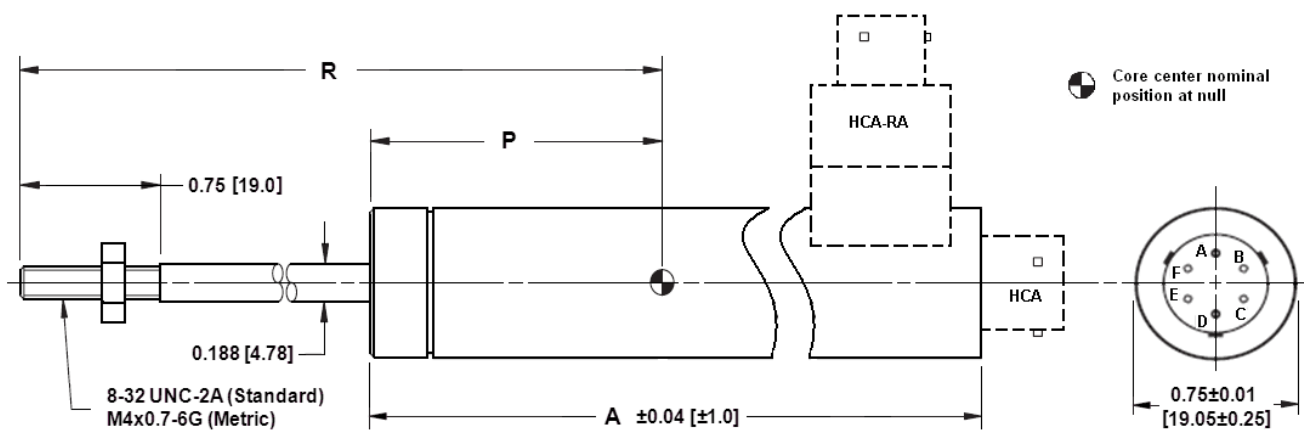
Dimensions are in inch [mm]

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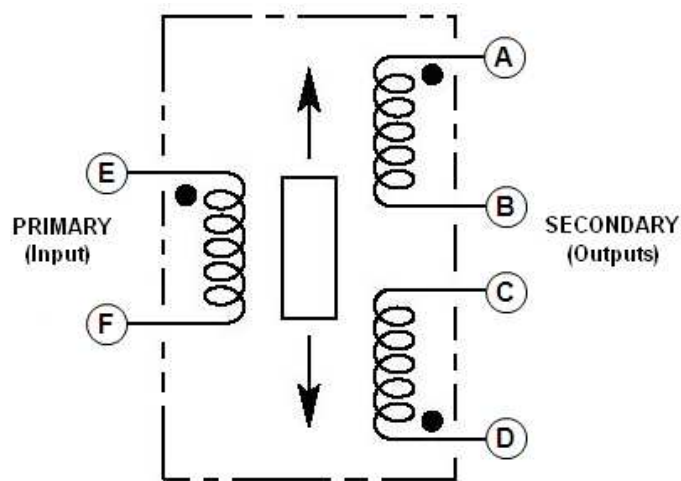
MECHANICAL SPECIFICATIONS – CAPTIVE CORE OPTION

| Parameter | HCA/HCA-RA 050 | HCA/HCA-RA 125 | HCA/HCA-RA 250 | HCA/HCA-RA 500 | HCA/HCA-RA 1000 | HCA/HCA-RA 2000 | HCA/HCA-RA 3000 |
|-------------------------------|----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|
| Body length "A" | 2.00 [50.8] | 2.84 [72.1] | 3.70 [94.0] | 5.39 [136.9] | 7.63 [193.8] | 11.02 [279.9] | 16.10 [408.9] |
| Core center at null "P" | 0.89 [22.6] | 1.30 [33.0] | 1.73 [43.9] | 2.57 [65.3] | 3.66 [93.0] | 5.39 [136.9] | 7.93 [201.4] |
| Core rod position at null "R" | 3.70 [94.0] | 4.28 [108.7] | 4.75 [120.6] | 6.04 [153.4] | 7.90 [200.7] | 10.52 [267.2] | 15.27 [387.9] |
| Weight, oz [grams] | 1.98 [56] | 2.61 [74] | 3.14 [89] | 4.06 [115] | 6.63 [188] | 7.37 [209] | 10.62 [301] |



Dimensions are in inch [mm]

WIRING INFORMATION



A through F: Connector pin assignments
Connect B to C for differential output

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ORDERING INFORMATION

| Description | HCA Model | Part Number |
|------------------|-----------|--------------|
| ±0.050 inch LVDT | HCA 050 | 02560413-000 |
| ±0.125 inch LVDT | HCA 125 | 02560414-000 |
| ±0.25 inch LVDT | HCA 250 | 02560415-000 |
| ±0.5 inch LVDT | HCA 500 | 02560416-000 |
| ±1 inch LVDT | HCA 1000 | 02560417-000 |
| ±2 inch LVDT | HCA 2000 | 02560418-000 |
| ±3 inch LVDT | HCA 3000 | 02560419-000 |
| ±4 inch LVDT | HCA 4000 | 72560000-000 |
| ±5 inch LVDT | HCA 5000 | 02560420-000 |
| ±10 inch LVDT | HCA 10000 | 02560421-000 |

| Description | HCA-RA Model | Part Number |
|------------------|--------------|--------------|
| ±0.050 inch LVDT | HCA-RA 050 | 02560413-500 |
| ±0.125 inch LVDT | HCA-RA 125 | 02560414-500 |
| ±0.25 inch LVDT | HCA-RA 250 | 02560415-500 |
| ±0.5 inch LVDT | HCA-RA 500 | 02560416-500 |
| ±1 inch LVDT | HCA-RA 1000 | 02560417-500 |
| ±2 inch LVDT | HCA-RA 2000 | 02560418-500 |
| ±3 inch LVDT | HCA-RA 3000 | 02560419-500 |
| ±4 inch LVDT | HCA-RA 4000 | 72560000-500 |
| ±5 inch LVDT | HCA-RA 5000 | 02560420-500 |
| ±10 inch LVDT | HCA-RA 10000 | 02560421-500 |

| OPTIONS | | |
|---|---|-------------|
| Description | Comments | Part Number |
| 5.0 kHz calibration | HCA/HCA-RA 050 through HCA/HCA-RA 500 only | xxxxxxx-002 |
| 10 kHz calibration | | xxxxxxx-003 |
| Metric threaded core (Non-captive) or connecting rod (Captive core) | All | xxxxxxx-006 |
| Guided core | Available on non-captive core models only | xxxxxxx-010 |
| Small-diameter/low-mass core <i>(consult factory for mass and dimensions)</i> | | xxxxxxx-020 |
| Captive core | HCA/HCA-RA 050 through HCA-RA 3000 only | xxxxxxx-200 |

Note: Add multiple option dash numbers together to determine proper ordering suffix

Example: HCA-RA 1000, ±1 inch, right angle connector model, with captive core and 5 kHz calibration, P/N 0256417-702

| ACCESSORIES FOR HCA AND HCA-RA | | |
|---|-------------------------------|--------------|
| Description | Comments | Part Number |
| Core connecting rod, 6 inches long, 4-40 threads | | 05282946-006 |
| Core connecting rod, 12 inches long, 4-40 threads | | 05282946-012 |
| Core connecting rod, 24 inches long, 4-40 threads | | 05282946-024 |
| Core connecting rod, 36 inches long, 4-40 threads | | 05282946-036 |
| Core connecting rod, 6 inches long, M3x0.5 metric threads | | 05282977-006 |
| Core connecting rod, 12 inches long, M3x0.5 metric threads | | 05282977-012 |
| Mounting block | | 04560950-000 |
| Mating connector kit | PT06A-10-6S(SR) | 62101011-000 |
| Interconnect cable for LVM-110 and LiM 4-20 Signal Conditioners (1) | HCA/HCA-RA to Stripped/Tinned | 04290417-000 |
| Interconnect cable for IEM-422 Signal Conditioner (1) | HCA/HCA-RA to PTO6A-10-6P | 04290133-000 |
| Interconnect cable for ATA-2001 Signal Conditioner (1) | HCA/HCA-RA to DB-9P | 04290457-000 |
| Interconnect cable for MP-2000 Series Set-Point Controller (1) | HCA/HCA-RA to 05BL5M | 04290560-000 |
| Interconnect cable for LDM/PML-1000 Signal Conditioners, 200°C (1) | HCA/HCA-RA to Stripped/Tinned | 04290595-000 |

(1) All cables are shielded, 10 foot long, and rated 80°C [176°F] operating unless otherwise noted. Consult factory for other lengths.

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