



## 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  $\pm 0.05$  to  $\pm 10$  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.

#### 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

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).

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).

## PERFORMANCE SPECIFICATIONS

| ELECTRICAL SPECIFICATIONS          |                      |                      |                      |                      |                       |                       |                       |                       |                       |                        |
|------------------------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| Parameter                          | HCA<br>HCA-RA<br>050 | HCA<br>HCA-RA<br>125 | HCA<br>HCA-RA<br>250 | HCA<br>HCA-RA<br>500 | HCA<br>HCA-RA<br>1000 | HCA<br>HCA-RA<br>2000 | HCA<br>HCA-RA<br>3000 | HCA<br>HCA-RA<br>4000 | HCA<br>HCA-RA<br>5000 | HCA<br>HCA-RA<br>10000 |
| Stroke range                       | ±0.050<br>[±1.27]    | ±0.125<br>[±3.17]    | ±0.25<br>[±6.35]     | ±0.5<br>[±12.7]      | ±1<br>[±25.4]         | ±2<br>[±50.8]         | ±3<br>[±76.2]         | ±4<br>[±101.6]        | ±5<br>[±127]          | ±10<br>[±254]          |
| Sensitivity V/V/inch<br>mV/V/mm    | 4.2<br>[165]         | 2.4<br>[94.5]        | 1.6<br>[63.0]        | 1.1<br>[43.3]        | 0.84<br>[33.1]        | 0.32<br>[12.6]        | 0.20<br>[7.9]         | 0.18<br>[4.6]         | 0.16<br>[6.3]         | 0.13<br>[5.1]          |
| Output at stroke<br>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<br>(PRIMARY)       | 430Ω                 | 1710Ω                | 800Ω                 | 900Ω                 | 900Ω                  | 525Ω                  | 930Ω                  | 1000Ω                 | 1200Ω                 | 930Ω                   |
| Output impedance<br>(SECONDARY)    | 950Ω                 | 1820Ω                | 940Ω                 | 1150Ω                | 2100Ω                 | 535Ω                  | 1040Ω                 | 580Ω                  | 1640Ω                 | 3000Ω                  |
| Non-linearity                      | ±% of FR             |                      |                      |                      |                       |                       |                       |                       |                       |                        |
| @100% stroke<br>(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<br>(**)          | 0.50                  | /                     | 0.80                  | 0.90<br>(**)           |
| @150% stroke                       | 0.50                 | 0.50                 | 0.50                 | 0.55<br>(**)         | 0.55<br>(**)          | 0.70<br>(**)          | 1.00<br>(**)          | /                     | /                     | /                      |
| 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

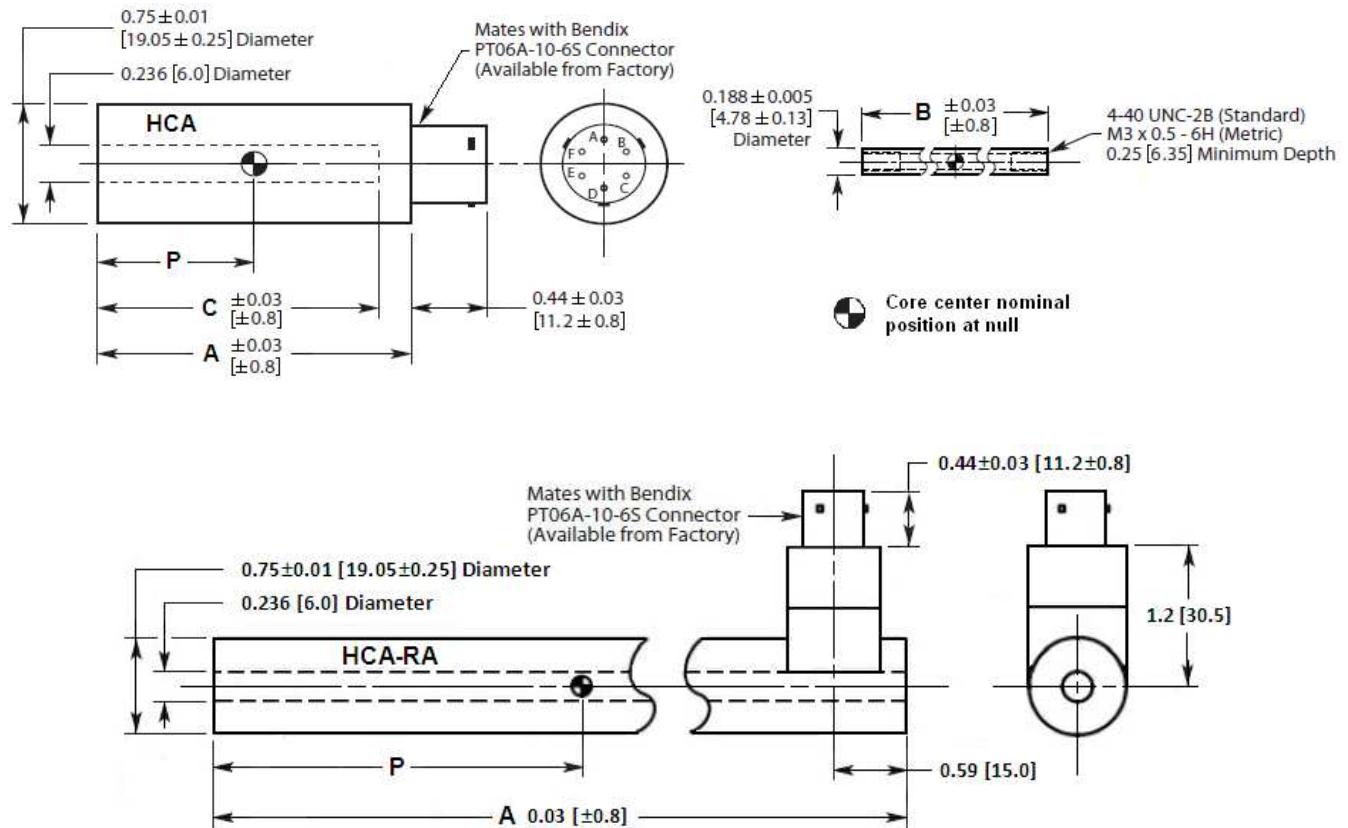
FRO (Full Range Output): Algebraic difference in outputs measured at the ends of the range

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

(\*\*) Requires special reduced core length

### MECHANICAL SPECIFICATIONS – NON CAPTIVE CORE (STANDARD)

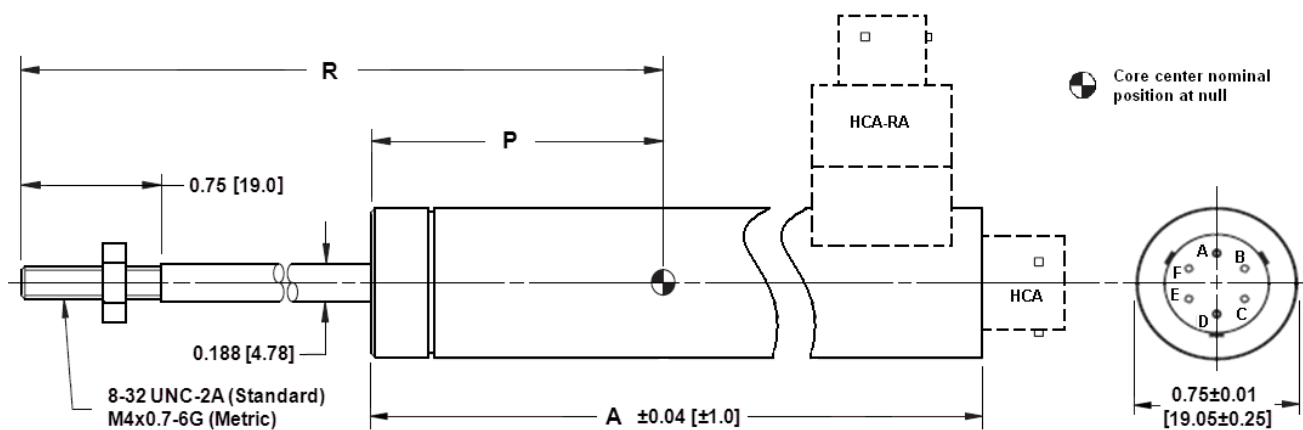
| Parameter                     | HCA<br>HCA-RA<br>050 | HCA<br>HCA-RA<br>125 | HCA<br>HCA-RA<br>250 | HCA<br>HCA-RA<br>500 | HCA<br>HCA-RA<br>1000 | HCA<br>HCA-RA<br>2000 | HCA<br>HCA-RA<br>3000 | HCA<br>HCA-RA<br>4000 | HCA<br>HCA-RA<br>5000 | HCA<br>HCA-RA<br>10000 |
|-------------------------------|----------------------|----------------------|--------------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



Dimensions are in inch [mm]

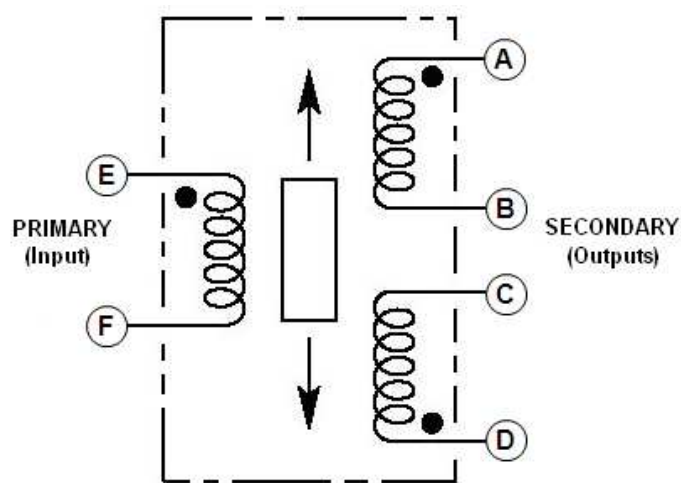
### MECHANICAL SPECIFICATIONS – CAPTIVE CORE OPTION

| 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<br>[50.8] | 2.84<br>[72.1]  | 3.70<br>[94.0]  | 5.39<br>[136.9] | 7.63<br>[193.8] | 11.02<br>[279.9] | 16.10<br>[408.9] |
| Core center at null "P"       | 0.89<br>[22.6] | 1.30<br>[33.0]  | 1.73<br>[43.9]  | 2.57<br>[65.3]  | 3.66<br>[93.0]  | 5.39<br>[136.9]  | 7.93<br>[201.4]  |
| Core rod position at null "R" | 3.70<br>[94.0] | 4.28<br>[108.7] | 4.75<br>[120.6] | 6.04<br>[153.4] | 7.90<br>[200.7] | 10.52<br>[267.2] | 15.27<br>[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

## 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<br>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<br>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<br>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.

## HCA & HCA-RA SERIES

Hermetically Sealed AC LVDT

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### NORTH AMERICA

Measurement Specialties, Inc.,  
a TE Connectivity company  
Tel: 800-522-6752  
Email: [customercare.frmr@te.com](mailto:customercare.frmr@te.com)

### EUROPE

Measurement Specialties (Europe), Ltd.,  
a TE Connectivity Company  
Tel: 800-440-5100  
Email: [customercare.bevx@te.com](mailto:customercare.bevx@te.com)

### ASIA

Measurement Specialties (China) Ltd.,  
a TE Connectivity company  
Tel: 0400-820-6015  
Email: [customercare.shzn@te.com](mailto:customercare.shzn@te.com)

[TE.com/sensorsolutions](http://TE.com/sensorsolutions)

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