

# MHR Series



- Small size and low mass core
- High output signal
- Stroke ranges from  $\pm 0.005$  to  $\pm 2.0$  inches
- AC operation from 2kHz to 20kHz
- Operating temperature up to 220°C (optional)
- Mild radiation resistance versions (optional)
- Stainless steel housing
- Imperial or metric threaded core

## DESCRIPTION

The legendary **MHR Series** LVDTs provide precision measurements in space restrictive applications. With a diameter of just 3/8 inch [9.5mm], and an extremely lightweight core, the MHR Series is ideal for applications where excessive core weight could influence the motion of the measurand; with less inertia, accurate measurements at higher displacement speeds are easier to achieve. The lightweight core also reduces mechanical stresses and helps preserve the structural integrity of the core actuation assembly.

The high output sensitivity resulting from the close electrical coupling between the coil and core provides ample signal for interfacing with practically all signal conditioners and conditioning circuits. The magnetic stainless steel housing provides electromagnetic and electrostatic shielding.

Available in a variety of stroke ranges from  $\pm 0.005$  to  $\pm 2.0$  inches, the MHR Series can be configured for optional mild radiation resistance ( $10^{12}$  NVT total integrated flux;  $10^7$  rads Gamma) and high temperature operation ( $+220^\circ\text{C}$ ). High pressure (vented case) versions are also available (*consult factory*). The MHR Series is compatible with the full line of Measurement Specialties LVDT signal conditioners.

Measurement Specialties, Inc. (NASDAQ MEAS) offers many other types of sensors and signal conditioners. Data sheets can be downloaded from our web site at: <http://www.meas-spec.com/datasheets.aspx>

MEAS acquired Schaevitz Sensors and the **Schaevitz**® trademark in 2000.

## FEATURES

- Compact size
- Lightweight / low mass core
- $\pm 0.25\%$  linearity (100% stroke)
- Shock and vibration tolerant
- Mild radiation resistance (optional)
- Calibration certificate supplied with each unit

## APPLICATIONS

- X, Y, Z stage position feedback
- Wire-die bonding machines
- Cylinder position feedback
- Voice coil testing
- Materials testing machines
- Space restricted installations

# MHR Series

## PERFORMANCE SPECIFICATIONS

ELECTRICAL SPECIFICATIONS (common)	
Input voltage	3Vrms sine wave
Input freq. range	2kHz to 20kHz
Test frequency	2.5kHz (standard)

ELECTRICAL SPECIFICATIONS @ 10kHz (recommended operation)									
Parameter	005 MHR	010 MHR	025 MHR	050 MHR	100 MHR	250 MHR	500 MHR	1000 MHR	2000 MHR
Stroke range	±0.005 [±0.13]	±0.010 [±0.25]	±0.025 [±0.64]	±0.05 [±1.27]	±0.10 [±2.54]	±0.25 [±6.35]	±0.5 [±12.7]	±1 [±25.4]	±2 [±50.8]
Sensitivity mV/V/.001in [mV/V/mm]	8.70 [343]	6.05 [238]	8.10 [319]	3.15 [124]	2.80 [110]	2.07 [81]	1.96 [77]	0.77 [30]	0.49 [19]
Output at stroke ends, mV/V (*)	43.5	60.5	202.5	157.5	280	517.5	980	770	980
Phase shift	+38°	+20°	+15°	+8°	+5°	+7°	+4°	+1.5°	+15°
Input impedance (PRIMARY)	84Ω	165Ω	238Ω	419Ω	400Ω	345Ω	264Ω	155Ω	504Ω
Output impedance (SECONDARY)	302Ω	300Ω	485Ω	154Ω	200Ω	420Ω	810Ω	450Ω	1780Ω
Linearity, ±% of FS									
@ 50% stroke	0.20	0.10	0.15	0.15	0.15	0.15	0.15	0.20	/
<b>@100% stroke (maximum)</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.50</b>
@125% stroke	0.30	0.35	0.25	0.35	0.25	0.35	0.30	0.50	/
@150% stroke	0.40	0.35	0.30	0.50	0.30	0.50	0.75	/	/
Null voltage (max)	5% FSO	1% FSO	0.5% FSO	0.5% FSO	0.5% FSO	0.5% FSO	0.5% FSO	0.5% FSO	0.5% FSO

ELECTRICAL SPECIFICATIONS @ 2.5kHz (standard)									
Parameter	005 MHR	010 MHR	025 MHR	050 MHR	100 MHR	250 MHR	500 MHR	1000 MHR	2000 MHR
Stroke range	±0.005 [±0.13]	±0.010 [±0.25]	±0.025 [±0.64]	±0.05 [±1.27]	±0.10 [±2.54]	±0.25 [±6.35]	±0.5 [±12.7]	±1 [±25.4]	±2 [±50.8]
Sensitivity mV/V/.001in [mV/V/mm]	3.19 [126]	3.36 [132]	4.36 [172]	2.55 [100]	2.40 [94]	1.73 [68]	1.60 [63]	0.70 [27]	0.47 [19]
Output at stroke ends, mV/V (*)	16	33.6	109	127.5	240	432.5	800	700	940
Phase shift	+73°	+59°	+58°	+36°	+30°	+29°	+19°	+6°	+3°
Input impedance (PRIMARY)	59Ω	78Ω	116Ω	141Ω	135Ω	147Ω	145Ω	100Ω	304Ω
Output impedance (SECONDARY)	260Ω	192Ω	286Ω	90Ω	125Ω	268Ω	445Ω	370Ω	13620Ω
Linearity % of FS									
@ 50% stroke	0.20	0.10	0.15	0.15	0.15	0.15	0.15	0.20	/
<b>@100% stroke (maximum)</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>	<b>0.25</b>
@125% stroke	0.30	0.35	0.25	0.35	0.25	0.35	0.30	0.50	/
@150% stroke	0.40	0.35	0.30	0.50	0.30	0.50	0.75	/	/
Null voltage (max)	6% FSO	3% FSO	0.5% FSO	0.5% FSO	0.5% FSO	0.5% FSO	0.5% FSO	0.5% FSO	0.5% FSO

# MHR Series

## 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
Lead-wire type/length	Six lead-wires, 32 AWG stranded Copper, PTFE insulated, 1 foot [0.3m] long

**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

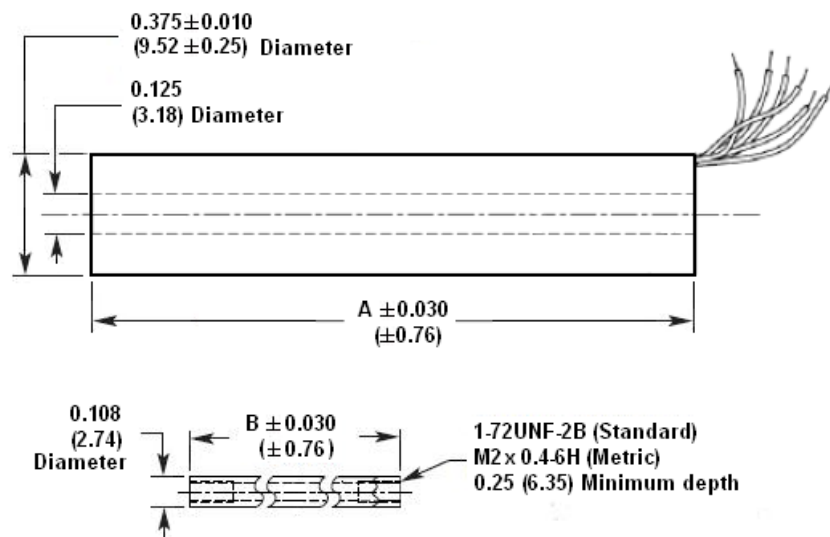
FS: Full Scale is 2X for ±X stroke

FSD: Full Scale Output is the output at X position for ±X stroke

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

## MECHANICAL SPECIFICATIONS

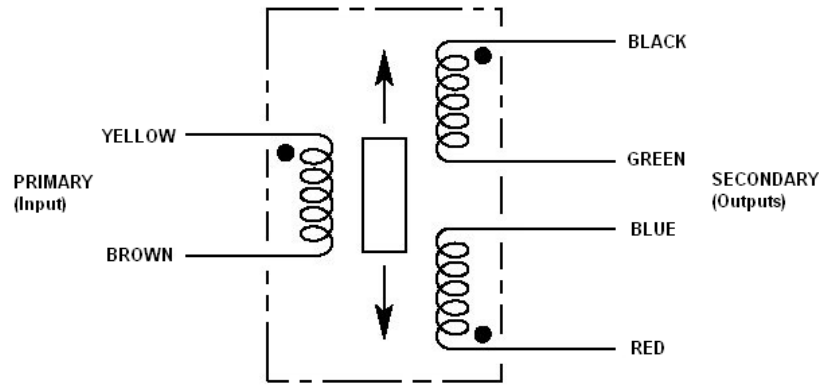
	050 HR	100 MHR	025 MHR	050 MHR	100 MHR	250 MHR	500 MHR	1000 MHR	2000 MHR
Body length "A"	0.375 [9.5]	0.535 [13.6]	0.660 [16.8]	0.815 [20.7]	0.990 [25.1]	1.850 [47.0]	3.300 [83.82]	5.600 [142.2]	8.000 [203.2]
Core length "B"	0.180 [4.6]	0.233 [5.9]	0.400 [10.2]	0.500 [12.7]	0.625 [15.9]	1.125 [28.6]	2.000 [50.8]	3.000 [76.2]	3.00 [76.2]
Body weight, oz [g]	0.07 [2]	0.11 [3]	0.18 [5]	0.21 [6]	0.21 [6]	0.32 [9]	0.60 [17]	0.92 [26]	1.4 [40]
Core weight, oz [g]	0.004 [0.1]	0.007 [0.2]	0.016 [0.5]	0.016 [0.5]	0.025 [0.7]	0.032 [0.9]	0.056 [1.6]	0.088 [2.5]	0.088 [2.5]



Dimensions are in inches (mm)

# MHR Series

## WIRING SCHEMATIC



Connect Blue to Green for differential output

## ORDERING INFORMATION

Description	Model	Part Number	Description	Model	Part Number
±0.005 inch LVDT	005 MHR	02560405-000	±0.250 inch LVDT	250 MHR	02560410-000
±0.010 inch LVDT	010 MHR	02560406-000	±0.500 inch LVDT	500 MHR	02560411-000
±0.025 inch LVDT	025 MHR	02560407-000	±1.00 inch LVDT	1000 MHR	02560412-000
±0.050 inch LVDT	050 MHR	02560408-000	±2.00 inch LVDT	2000 MHR	02561033-000
±0.100 inch LVDT	100 MHR	02560409-000			
Options					Part Number
5.0 KHz calibration					XXXXXXXX-002
10 KHz calibration					XXXXXXXX-003
Metric threaded core					XXXXXXXX-006
Mild radiation resistance ( <i>Consult factory</i> )					XXXXXXXX-080

**Note:**

Add multiple option dash numbers together to determine proper ordering suffix

Example: 1000 MHR, ±1 inch, with 5 KHz calibration and mild radiation resistance, P/N 02560412-082

Accessories	Part Number
Core connecting rod, 6 inches long, 1-72 threads	05282945-006
Core connecting rod, 12 inches long, 1-72 threads	05282945-012
Core connecting rod, 24 inches long, 1-72 threads	05282945-024
Core connecting rod, 36 inches long, 1-72 threads	05282945-036
Core connecting rod, 6 inches long, M2x0.4 metric threads	05282976-006
Core connecting rod, 12 inches long, M2x0.4 metric threads	05282976-012
Mounting block	04560954-000

**Note:**

Refer to our "[Accessories for LVDT's](#)" brochure for our LVDT signal conditioning instrumentation and other accessories

# MHR Series

## TECHNICAL CONTACT INFORMATION

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