Penny+Giles
A Curtiss-Wright Company

LVDT DISPLACEMENT TRANSDUCERS

The Penny+Giles high performance ratiometric LVDTs benefit from our extensive experience in fly-by-wire control systems for flight critical aerospace applications. Using high integrity coil, screen and connection assemblies, combined with welded and vacuum brazed stainless steel construction, these LVDTs can be supplied in a range of shaft and body configurations to suit clutch, gearbox, engine and brake applications.

Features

- No contact between the sensing elements
- Infinite resolution
- Small transducer body length to stroke ratio
- Welded and vacuum brazed stainless steel construction
- Sealed to IP66
- Temperature range -55 to +200°C
- High integrity coil, screen and connection assemblies
- Screened and sheathed interface cable
- Temperature error less than 35ppm/°C

Benefits

- Virtually infinite life and fast dynamic response
- All displacement will be sensed
- Minimal operational footprint and weight

- Maximum reliability in hostile environments

- High performance in electrically noisy environments
- Maximises system accuracy

A F 1 1 1 LVDT

The AF111 range of high accuracy LVDT displacement transducers have been designed primarily for use in the ratiometric configuration and have a compact size, with stroke lengths from 5mm to 150mm. Suitable for clamp mounting, the AF111 range has a threaded, unguided core assembly to simplify installation. Suited to numerous applications, such as vehicle research, and test rigs.

PERFORMANCE

Electrical stroke E	mm	5	15	25	50	75	100	125	150
±		2.5	7.5	12.5	25.0	37.5	50.0	62.5	75.0

Input voltage and frequency 1 to 10VRMS at 400Hz to 12.5kHz (sinewave)

Insulation resistance Greater than 100MΩ at 500Vdc

Operational temperature °C -35 to +125

Storage temperature °C -55 to +135

Vibration RTCA/DO - 160C, Section 8, Fig 8 - 1 Curve C (Random), 10 - 2000Hz, 4.12g rms

RTCA/DO - 160C, Section 8, Fig 8 - 3 Curve L (Sine), 10 - 2000Hz, 3g rms

Environmental protection IP66

Electrical output R proportional to position

$$R = \frac{V_a - V_b}{V_a + V_b}$$

Electrical output R at extremes from null ±1% total stroke	0.3	0.3	0.4	0.4	0.6	0.6	0.6	0.6
Non-linearity ±% total stroke	0.25	0.25	0.25	0.25	0.25	0.125	0.125	0.125

Secondary coil output voltage 3.3VRMS maximum

Input impedance Greater than 300Ω

Load resistance (per coil) Greater than 50kΩ (non reactive)

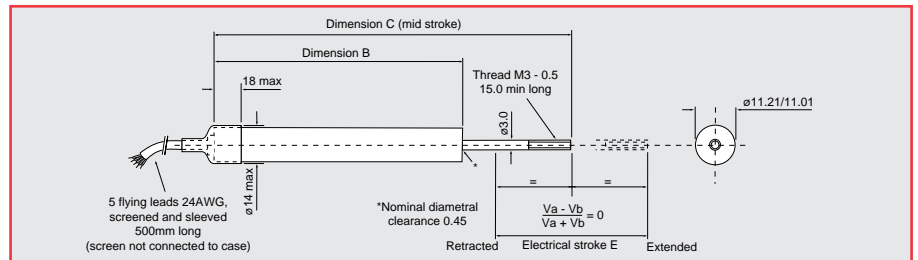| Temperature error maximum % total stroke/°C	0.0012	0.0012	0.0012	0.0018	0.0018	0.0035	0.0030	0.0030

OUTPUT SCHEMATIC
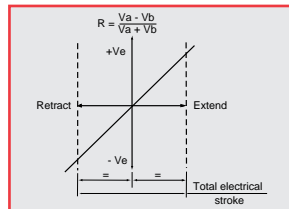
Ratiometric configuration

DIMENSIONS

Note: drawings not to scale

Electrical stroke E	mm	5	15	25	50	75	100	125	150
Mechanical stroke M (non captive shaft)	mm	9	19	29	54	79	104	129	154
Dimension B	mm	55	65	80	105	150	175	215	240
Dimension C	mm	75	90	110	147.5	205	242.5	295	332.5
Weight (maximum)	g	45	50	55	67	90	100	120	140

AVAILABILITY

Normally available from stock

ORDERING CODE

AF111/.....

Electrical stroke (total) mm ─────────────┘

ELECTRICAL CONNECTIONS See AF145 page 15

AF145 LVDT

The AF145 range of high accuracy LVDT displacement transducers have been designed primarily for use in the ratiometric configuration, and have a compact size, with stroke lengths from 5mm to 150mm. The AF145 has self-aligning rod end bearing mounting, with an outer sliding sleeve which protects the movable core whilst enhancing the rigidity of the transducer during operation. Suited to harsh automotive and industrial environments.

PERFORMANCE

Electrical stroke E	mm	5	15	25	50	75	100	125	150
	±	2.5	7.5	12.5	25.0	37.5	50.0	62.5	75.0

Input voltage and frequency — 1 to 10VRMS at 400Hz to 12.5kz (sinewave)

Insulation resistance — Greater than 100MΩ at 500Vdc

Operational temperature °C — -35 to +125

Storage temperature °C — -55 to +135

Vibration — RTCA/DO - 160C, Section 8, Fig 8 - 1 Curve C (Random), 10 - 2000Hz, 4.12g rms

RTCA/DO - 160C, Section 8, Fig 8 - 3 Curve L (Sine), 10 - 2000Hz, 3g rms

Environmental protection — IP66

Electrical output R proportional to position

$$R = \frac{Va - Vb}{Va + Vb}$$

Electrical output R at extremes from null ±1% total stroke	0.3	0.3	0.4	0.4	0.6	0.6	0.6	0.6
Non-linearity ±% total stroke	0.25	0.25	0.25	0.25	0.25	0.125	0.125	0.125

Secondary coil output voltage — 3.3VRMS maximum

Input impedance — Greater than 300Ω

Load resistance (per coil) — Greater than 50kΩ (non reactive)

Temperature error maximum % total stroke/°C	0.0012	0.0012	0.0012	0.0020	0.0020	0.0030	0.0030	0.0030

OUTPUT SCHEMATIC

See AF111 page 14

DIMENSIONS

Note: drawings not to scale
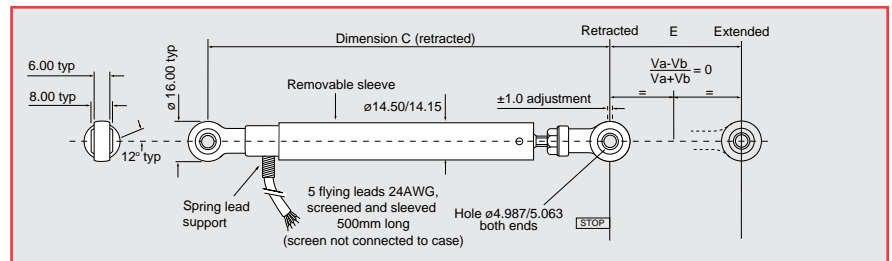
Electrical stroke E	mm	5	15	25	50	75	100	125	150
Mechanical stroke M (non captive shaft)	mm	9	19	29	54	79	104	129	154
Dimension C retracted	mm	100	110	125	150	195	220	260	285
Weight (maximum)	g	65	80	90	115	155	175	200	220

AVAILABILITY

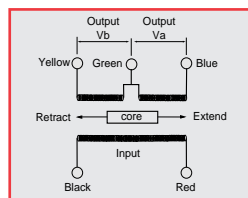Normally available from stock

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AF145/.....

Electrical stroke (total) mm

ELECTRICAL CONNECTIONS

5 flying leads 24AWG, screened and sleeved 500mm long

Phasing notes

With blue and black leads common, the output on the yellow lead will be in-phase with the red lead (input) as the shaft retracts from the null position.

Ø8mm LVDT
SPECIAL

This specially developed ac LVDT is an example of our capability in producing an extremely compact size (8mm diameter) with a minimal footprint (20mm stroke within a 44mm body length). This LVDT is also suitable for continuous operation at temperatures up to +200°C and is ideally suited for use in clutch position and brake caliper position measurement in the premier classes of motor sport. For optimum performance this LVDT is designed to operate in the ratiometric configuration.

PERFORMANCE

Electrical stroke E	mm	**20**
	±	**10**
Input voltage and frequency		3VRMS at 5kHz (sinewave)
Insulation resistance		Greater than 20MΩ at 500Vdc
Operational temperature	°C	-55 to +200
Environmental protection		IP66
Electrical output R proportional to position		$R = \dfrac{Va - Vb}{Va + Vb}$
Electrical output R at extremes from null ±1% total stroke		0.441
Non-linearity ±% total stroke		1
Ratiometric sensitivity per mm±3%		0.0441
Summed output voltage (Va+Vb) ±20%		0.7V/V
Total stroke ratio		0.882
Input impedance		Greater than 150Ω
Load resistance (per coil)		Greater than 50kΩ (non reactive)
Temperature error maximum % total stroke/°C		0.0030

OUTPUT SCHEMATIC

Ratiometric configuration
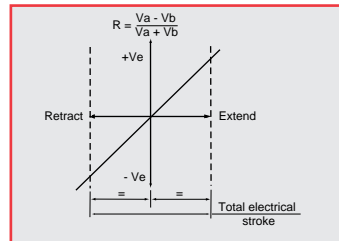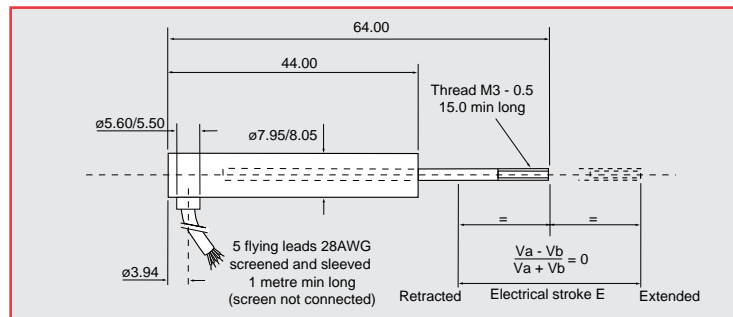

ac output schematic
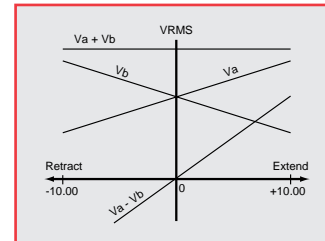
AVAILABILITY

Please consult our sales office for details

ORDERING CODE

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DIMENSIONS

Note: drawings not to scale

Electrical stroke E	mm	**20**
Mechanical stroke M (non captive shaft)	mm	**22**
Weight (maximum)	g	47 (15g for sensor and core only)

Ø11mm LVDT
SPECIAL

This high accuracy LVDT displacement transducer has been designed for use in the ratiometric configuration and has a compact size, with stroke lengths from 25mm to 75mm. This design has self-aligning rod end bearing mounting and features an outer sliding sleeve which protects the movable core whilst enhancing the rigidity of the transducer during operation. Suited to suspension and throttle position feedback applications in premier classes of motorsport.

PERFORMANCE

Electrical stroke E	mm	25	50	75
	±	12.5	25.0	37.5
Input voltage and frequency		3VRMS at 2.5kHz (sinewave)		
Insulation resistance		Greater than 20MΩ at 500Vdc		
Operational temperature	°C	-30 to +130		
Storage temperature	°C	-55 to +135		
Environmental protection		IP66		
Electrical output R proportional to position		$R = \dfrac{Va - Vb}{Va + Vb}$		
Electrical output R at extremes from null ±1% total stroke		0.5	0.5	0.5
Non-linearity ±% total stroke		0.5	0.5	0.5
Ratiometric sensitivity per mm		0.04	0.02	0.0133
Summed output voltage (Va+Vb) ±20%		0.641	0.872	0.761
Input impedance		Greater than 200Ω		
Load resistance (per coil)		Greater than 50kΩ (non reactive)		
Temperature error maximum % total stroke/°C		0.0030		

OUTPUT SCHEMATIC

See Ø8mm Special LVDT output schematic, page 16

AVAILABILITY
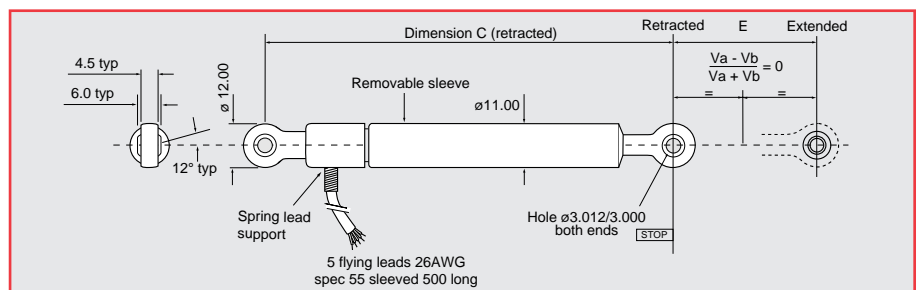
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Electrical stroke (total) mm
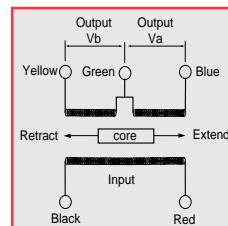
DIMENSIONS

Note: drawings not to scale

Electrical stroke E	mm	25	50	75
Mechanical stroke M (non captive shaft)	mm	27	52	77
Dimension C retracted	mm	115	135	180
Weight (maximum)	g	42	52	68

ELECTRICAL CONNECTIONS

SPECIAL Ø8mm

5 flying leads 28AWG, screened and sleeved 1000mm long

SPECIAL Ø11mm

5 flying leads 26AWG, screened and sleeved 500mm long

Ratiometric connection configuration
Phasing notes
With blue and black leads common, the output on the yellow lead will be in-phase with the red lead (input) as the shaft retracts from the null position.

Penny+Giles - one of the world's major suppliers of measurement and control sensors

throttle pedal position

gear select position indication

hydraulic reservoir level

front and rear suspension movement

throttle actuator position

steering angle position

gearbox actuator position

clutch pedal position

clutch actuator position

brake balance measurement

brake pad/disc wear indication

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commercial and industrial
applications.

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