

## Installation Instructions for the Aerospace Linear Variable Differential Transducers, 1LVT Series

Issue 1

# 32327730

### **⚠ WARNING** **IMPROPER INSTALLATION**

Consult with safety agencies and their requirements when designing a machine control, interface, and all elements that affect safety. Strictly adhere to all installation instructions.

**Failure to comply with these instructions could result in death or serious injury.**

### **⚠ WARNING** **PERSONAL INJURY**

Use the correct personal protection. The chemical solution can cause skin, eye, and lung damage. Follow the manufacturer's instructions.

**Failure to comply with these instructions could result in death or serious injury.**

### **⚠ WARNING** **INCORRECT WIRING**

Incorrect wiring will damage units. Strictly adhere to all installation instructions.

**Failure to comply with these instructions could result in death or serious injury.**

### PRODUCT NOMENCLATURE

The product nomenclature system is based on these key parameters

- Total electrical stroke
- Mounting type
- Termination (electrical interface)
- LVDT probe mounting

The "reserved" column is for the custom LVDT designs.

### INTRODUCTION

Honeywell 1LVT Series LVDTs (Linear Variable Differential Transformers) are high resolution, robust, ac-operated, and designed to operate under extreme environments. Qualified as per DO-160 procedures for aerospace applications, 1LVT Series products are intended to be used in various aerospace applications for position control and feedback.

Dual-channel LVDTs have two separate sensors in parallel or tandem that provide two independent outputs (channels A & B) for redundancy.

### ELECTRICAL CHARACTERISTICS

Characteristic	Parameter
Electrical stroke range	8,89 mm to 35,56 mm [0.35 in to 1.4 in]
Excitation voltage	7.07 V ±0.14 V RMS sinusoidal wave at 3000 Hz ±50 Hz

Figure 1. Single-Channel Product Nomenclature

Series	Channels	Stroke	Mounting	Termination	Probe Fitting	Reserved
1LVT Aerospace LVDT	S Single channel	035 8,89 mm [0.35 in]	A Threaded	A EN2997YE01005MN	A 0.138-32 threaded	
		050 12,7 mm [0.50 in]	B Flanged	B M83723/88P1005N	B 0.164-32 threaded	
		070 17,78 mm [0.70 in]		C D38999/27YB5XN		
		100 25,4 mm [1.0 in]		D Pigtail (flying leads)		
		140 35,56 mm [1.40 in]				

Figure 2. Dual-Tandem Product Nomenclature

Series	Channels	Stroke	Mounting	Termination	Probe Fitting	Reserved
1LVT Aerospace LVDT	T Dual tandem	035 8,89 mm [0.35 in]	A Threaded	D Flying leads	B 0.164-32 threaded	
		050 12,7 mm [0.50 in]	B Flanged			
		070 17,78 mm [0.70 in]				
		100 25,4 mm [1.0 in]				
		140 35,56 mm [1.40 in]				

Figure 3. Dual-Parallel Product Nomenclature

Series	Channels	Stroke	Mounting	Termination	Probe Fitting	Reserved
1LVT Aerospace LVDT	P Dual parallel	070 17,78 mm [0.70 in]	A Threaded	A EN2997YE01005MN*	A 0.138-32 threaded	
		100 25,4 mm [1.0 in]	B Flanged	B M83723/88P1005N*	B 0.164-32 threaded	
		140 35,56 mm [1.40 in]		C D38999/27YB5XN*		
				D Pigtail (flying leads)		

\*only available with flanged mounting type

## LVDT HANDLING AND INSTALLATION GUIDELINES

The LVDT body and magnetic probe rods are matched sets with identification by unique serial number engraved on the LVDT body (not shown in Figures). The magnetic core is manufactured to have homogeneity and high permeability to achieve greater performance requirements. The magnetic core is sensitive to mechanical stresses and should be handled carefully.

### **⚠ WARNING** **PRODUCT DAMAGE**

Do not operate the LVDT without the magnetic probe rod or core inside the LVDT bore (hole where the magnetic probe rod slides). Energizing the LVDT body alone may lead to damage of coils due to overheating.

## 1LVT (DUAL PARALLEL) SERIES

### Installation of LVDT Body: 1LVT Series

**Note:** It is important to keep the LVDT sensor free of foreign material such as oil, grease, dust, etc. If cleaning is necessary due to handling or re-installation, care must be taken to avoid causing scratches or damage to the seal grooves and mounting surface.

The LVDT has two O-ring grooves: AS568-119 size. In the wider groove, the O-ring is supported by two backup rings to avoid any O-ring extrusion due to fluid pressure. A typical thread mount LVDT with flying leads is shown in Figures 3 and 4.

The 24AWG (MIL-W-22759/33-24) lead wires should be routed. The LVDT thread #10-32 should be torqued to 18 in-lb to 20 in-lb max. with a nut and spring washer.

For the flanged version, the socket head screws should be torqued to 7 ft-lb to 9 ft-lb max. using high strength stainless steel screws. Honeywell recommends using NAS 1351/NAS 1352-compliant steel screws. A typical thread mount LVDT with connector orientation is shown in Figures 5 and 6.

Figure 3. LVDT, Dual Parallel, Thread Mount

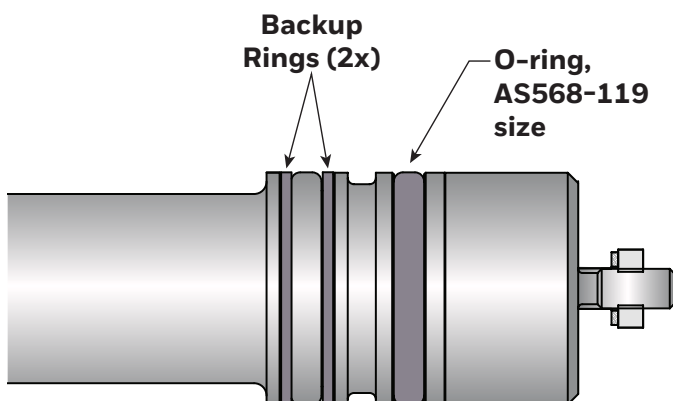


Figure 4. LVDT, Dual Parallel, Thread Mount

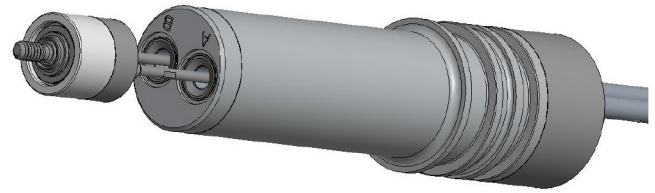


Figure 5. LVDT, Dual Parallel, Flange Mount with Connector

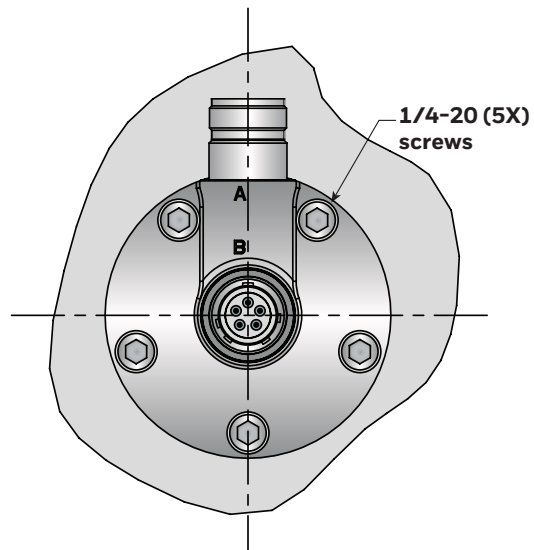
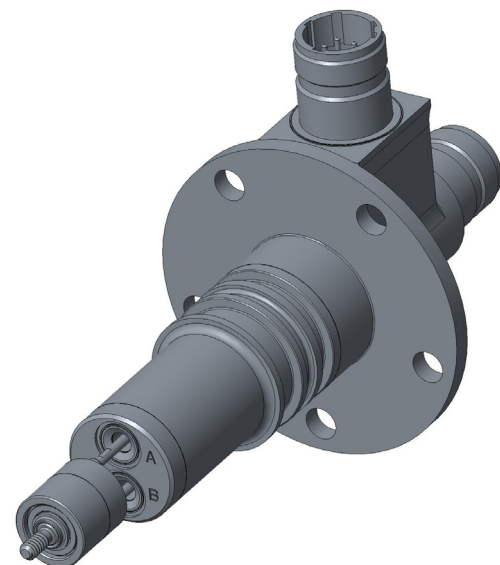


Figure 6. LVDT, Dual Parallel, Flange Mount with Connector

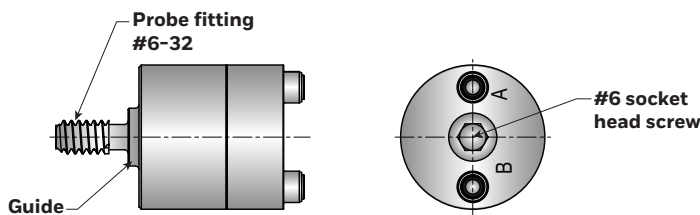


## Installation of Probe Fitting: 1LVT Series

The dual parallel threaded probe fitting is bearing mounted, so the position of the two parallel channels is not affected during assembly. Assemble the fitting with #6-32 thread to the interface using a #6 (0.110 in) Allen key and torque to 6 in-lb to 8 in-lb max. 17-4PH stainless steel or equivalent material is recommended for the interface. Materials with a greater thermal expansion than 17-4PH stainless steel should be avoided to eliminate or to reduce the electrical null offset at extreme operating temperatures. The channels are identified with A & B, and should slip in to the respective LVDT channels for the desired performance.

During the installation, ensure the defined rig position or electrical null is achieved.

**Figure 7. LVDT, Dual Parallel, Probe**



## Electrical connections: 1LVT Series

The typical electrical schematic is shown in Figure 10. These LVDTs use 7.07 V RMS with 3000 Hz excitation frequency. The recommended electrical loads (resistance and capacitance) should be used.

The flying lead variants will come with approximately 10-inch lead wires for easy installation.

Three types of hermetically sealed connectors are offered in flanged variant LVDTs. Connectors offered by Honeywell, include:

EN2997YE01005MN

M83723/88P1005N

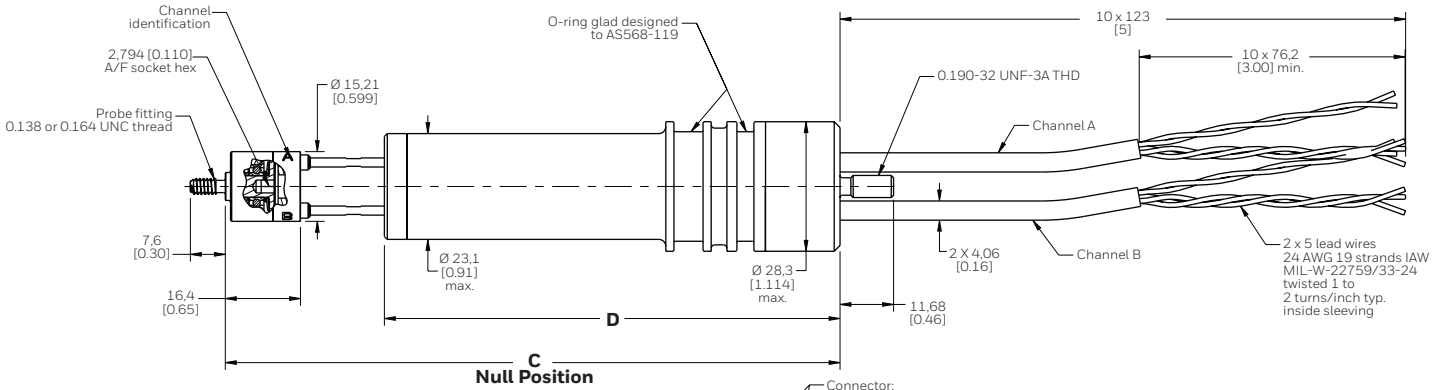
D38999/27YB5XN

The detailed mounting dimensions, electrical schematic, and stroke information is provided in Figures 8 to 12.

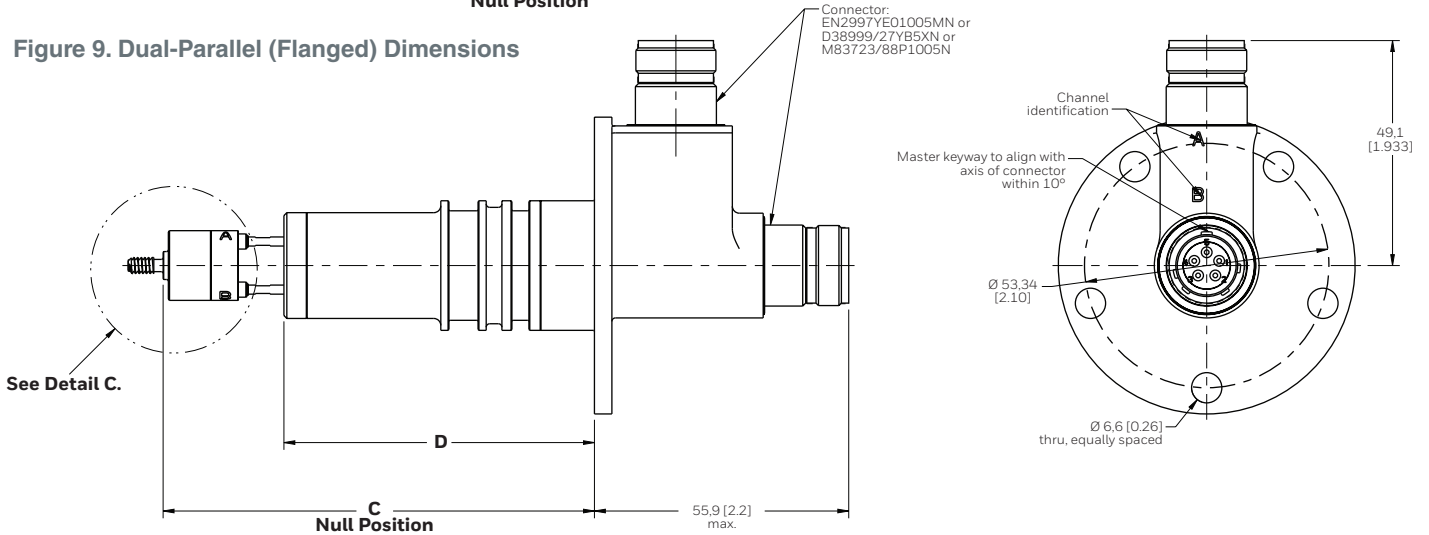
**Table 1. Hardware Requirements Per LVDT**

SI No.	Description	Quantity	Applicable
1	O-ring per AS568-119	2	All configurations
2	Backup ring (Size -119)	2	All configurations
3	Spring washer (10-32 Thread)	1	Threaded configurations
4	Lock nut #10-32 UNF-2B	1	Threaded configurations
5	0.250 in socket head screw (Screw pitch per mating part)	5	Flanged configurations

**Figure 8. Dual-Parallel (Wired) Dimensions**



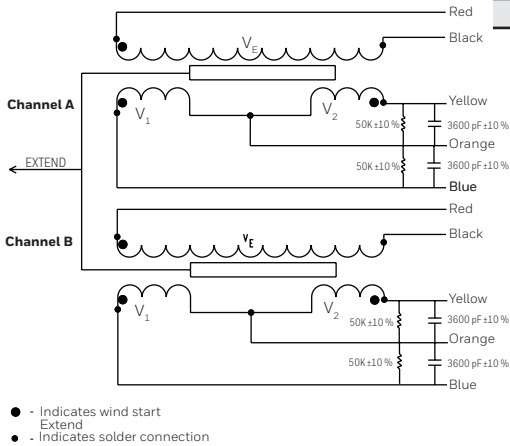
**Figure 9. Dual-Parallel (Flanged) Dimensions**



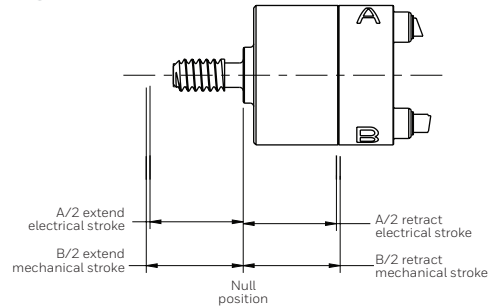
**Table 2. Dual-Parallel Dimensions**

Mounting Type	Catalog Listing	Total Electrical Stroke "B"	Total Mechanical Stroke "C"	Rig Position "C"	Housing Length	Weight
Threaded	1LVTP140ADA	35,56 mm [1.40 in]	4,06 mm [0.16 in]	135,1 mm [5.335 in]	100,33 mm [3.95 in]	0.55 lb max.
Flanged	1LVTP070BAA	17,78 mm [0.7 in]	18,29 mm [0.72 in]	94,16 mm [3.707 in]	68,58 mm [2.70 in]	1.00 lb max.

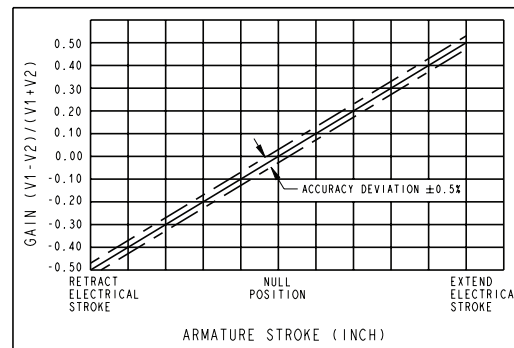
**Figure 10. Dual-Parallel Wiring**



**Figure 11. Dual-Parallel Stroke Definition**



**Figure 12. Dual-Parallel Gain vs. Stroke**



**Wire Color**

Pin Number	Channel A	Channel B
1	Red	Red
2	Black	Black
3	Blue	Blue
4	Orange	Orange
5	Yellow	Yellow

## 1LVT (SINGLE CHANNEL) SERIES

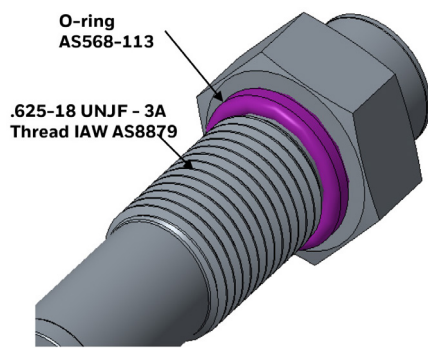
### Installation of LVDT Body: 1LVT Series

**Note:** It is important to keep the LVDT sensor free of foreign material such as oil, grease, dust, etc. If cleaning is necessary due to handling or re-installation, care must be taken to avoid causing scratches or damage to the seal grooves and mounting surface.

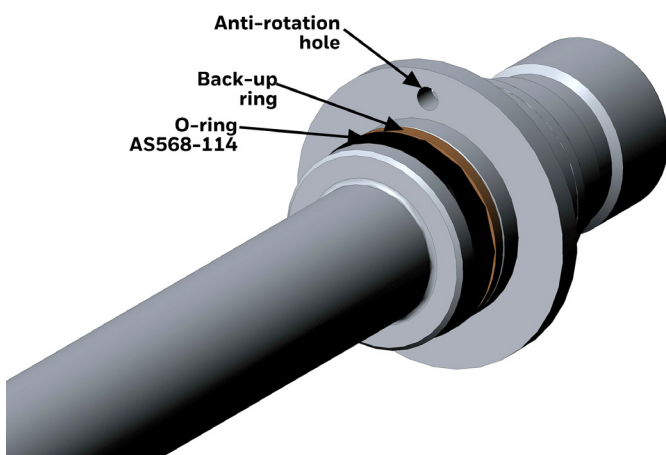
The AS568-113 sized O-ring grooves provide environmental sealing. A typical thread mount LVDT with flying leads is shown in Figure 13.

The flange mount variant has an anti-rotation hole for locking the LVDT's body to the housing. The AS568-114 size O-ring with one backup ring must be installed on the LVDT housing. A typical flange mount LVDT with flying leads is shown in Figure 14.

**Figure 13. LVDT, Single-Channel, Thread Mount**



**Figure 14. LVDT, Single-Channel, Flange Mount**



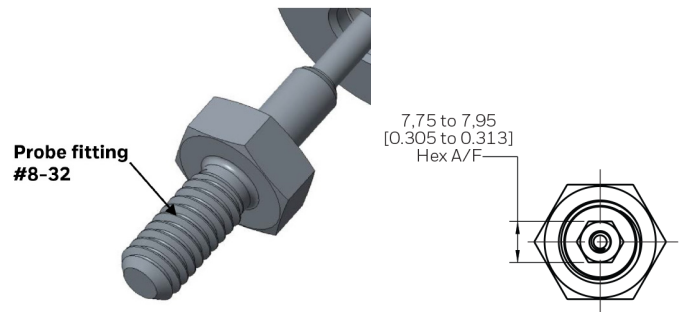
The 24AWG (MIL-W-22759/33-24) type lead wires should be routed. The LVDT body with 0.625-18 thread should be torqued to 10 ft-lb to 12 ft-lb max.

### Installation of Probe fitting: 1LVT Series

The threaded probe fitting should be assembled to the interface using a 5/16 A/F spanner and torqued to 9 in-lb to 10 in-lb max. 17-4PH stainless steel or equivalent material is recommended for the interface. Materials with a greater thermal expansion than 17-4PH stainless steel should be avoided to eliminate or to reduce the electrical null offset at extreme operating temperatures.

During the installation, ensure the defined rig position or electrical null is achieved.

**Figure 15. LVDT, Single Channel, Probe Tip**



### Electrical connections: 1LVT Series

The typical electrical schematic is shown in Figure 18. These LVDTs use 7.07 V RMS with 3000 Hz excitation frequency. The recommended electrical loads (resistance and capacitance) should be used.

The flying lead variants will come with approximately 10-inch lead wires for easy installation.

Three types of hermetically sealed connectors are offered in flanged variant LVDTs. Connectors offered by Honeywell include:

- EN2997YE01005MN
- M83723/88P1005N
- D38999/27YB5XN

The detailed mounting dimensions, electrical schematic, and stroke information is provided in Figures 16 to 20.

**Table 3. Hardware Requirements Per LVDT**

SI No.	Description	Quantity	Applicable
1	O-ring per AS568-113	1	Threaded configurations
2	O-ring per AS568-114	1	Flanged configurations
3	Back-up ring (Size -114)	2	Flanged configurations
4	Dowel pin	1	Flanged configurations

Figure 16. Single-Channel (Wired) Dimensions

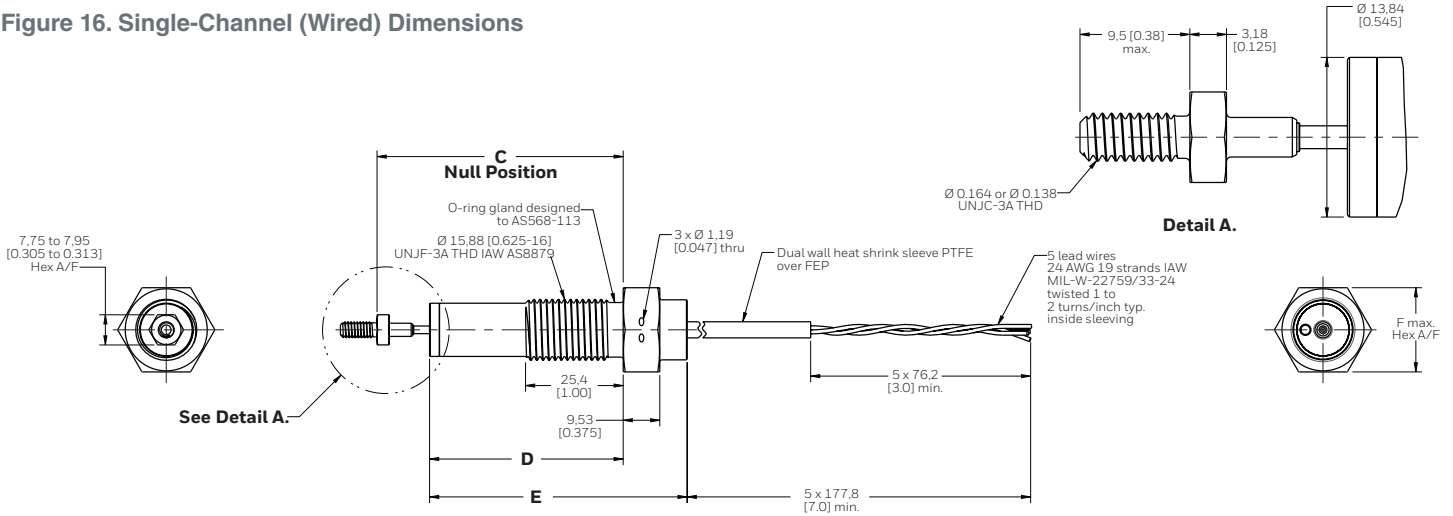


Figure 17. Single-Channel (Flanged) Dimensions

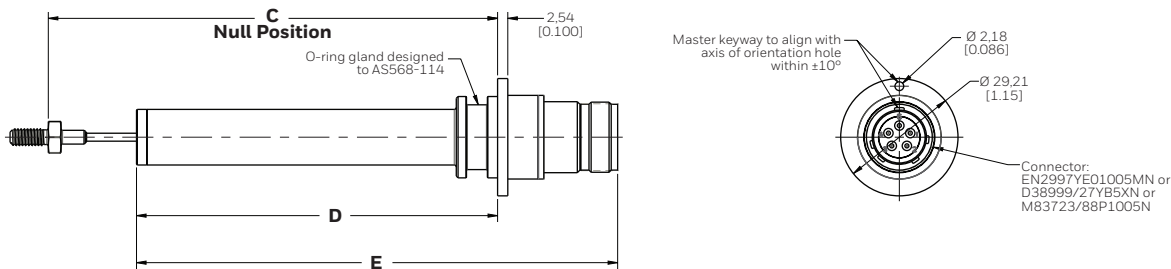


Table 4. Single Channel Dimensions

Mounting Type	Catalog Listing	Total Electrical Stroke "A"	Total Mechanical Stroke "B"	Rig Position "C"	Housing Length "D"	Housing Length "E"	Housing Length "F"	Weight
Threaded	1LVTS035ADB	8.89 mm [0.35 in]	9.4 mm [0.37 in]	64 mm [2.52 in]	50.3 mm [1.98 in]	67.06 mm [2.64 in]	22.23 mm [0.875 in]	0.22 lb max.
Threaded	1LVTS050ADB	12.7 mm [0.50 in]	13.2 mm [0.52 in]	66.04 mm [2.60 in]	50.3 mm [1.98 in]	67.06 mm [2.64 in]	22.23 mm [0.875 in]	0.22 lb max.
Flanged	1LVTS100BAB	25.4 mm [1.0 in]	25.91 mm [1.02 in]	111.76 mm [4.40 in]	89.9 mm [3.54 in]	119.89 mm [4.72 in]	-	0.30 lb max.

Figure 18. Single-Channel Wiring

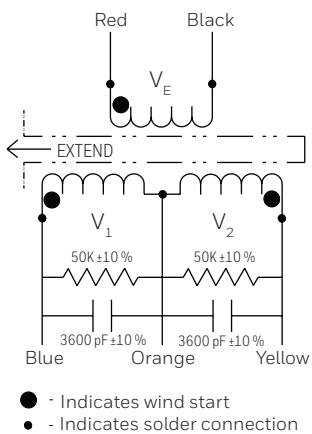


Figure 19. Single-Channel Stroke Definition

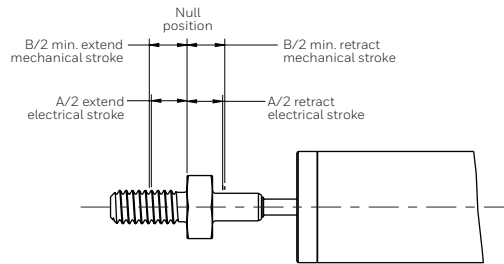
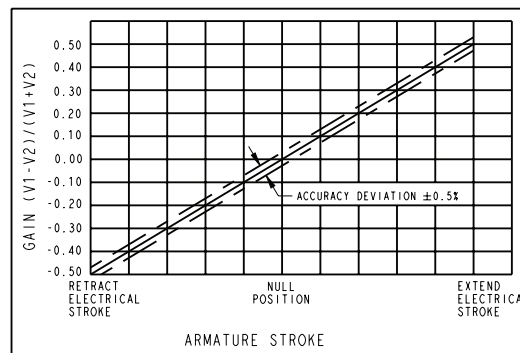


Figure 20. Single-Channel Gain vs. Stroke



## 1LVT (DUAL TANDEM) SERIES

### Installation of LVDT Body - 1LVT Series

**Note:** It is important to keep the LVDT sensor free of foreign material such as oil, grease, dust, etc. If cleaning is necessary due to handling or re-installation, care must be taken to avoid causing scratches or damage to the seal grooves and mounting surface.

The AS568-113 sized O-ring grooves provide environmental sealing. A typical thread mount LVDT with flying leads is shown in Figure 21.

The AS568-114 O-ring with one backup ring must be installed on the flanged LVDT housing grooves. A typical flange mount LVDT with flying leads is shown in Figure 22.

Figure 21. LVDT, Dual Tandem, Thread Mount

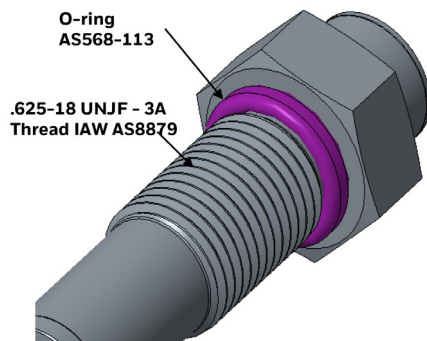
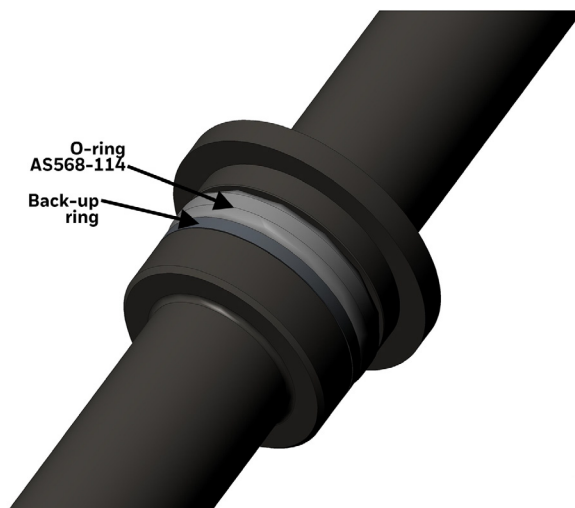
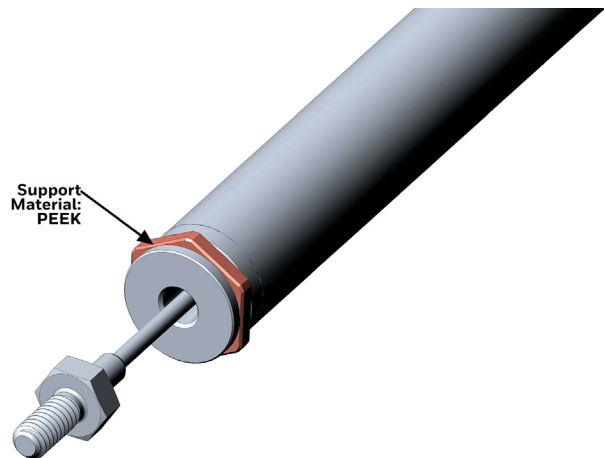


Figure 22. LVDT, Dual Tandem, Flange Mount



Since the tandem LVDT is long, it's recommended to have a front support made with PEEK (Polyetheretherketone) for better vibration withstanding capacity, as shown in Figure 23.

Figure 23. LVDT, Dual Tandem, Front Support



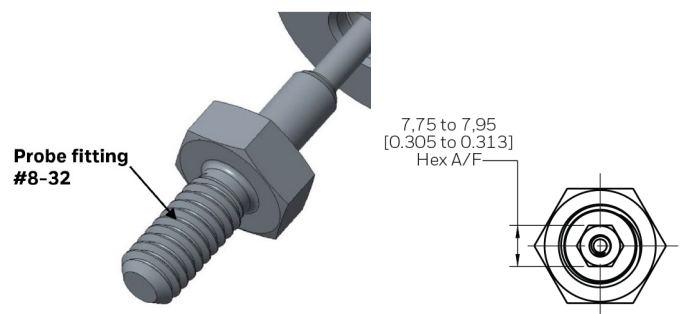
The 24AWG (MIL-W-22759/33-24) type lead wires should be routed and the LVDT body with 0.625-18 thread should be torqued to 10 ft-lb to 12 ft-lb max.

### Installation of Probe Fitting: 1LVT Series

The threaded probe fitting should be assembled to the interface using a 5/16 A/F spanner and torqued to 9 in-lb to 10 in-lb max. 17-4PH stainless steel or equivalent material is recommended for the interface. Materials with a greater thermal expansion than 17-4PH stainless steel should be avoided to eliminate or to reduce the electrical null offset at extreme operating temperatures.

During installation, ensure the defined rig position or electrical null is achieved.

Figure 24. LVDT, Single Channel, Probe Tip



### Electrical connections: 1LVT Series

The typical electrical schematic is shown in Figure 26. These LVDTs use 7.07 V RMS with 3000 Hz excitation frequency. The recommended electrical loads (resistance and capacitance) should be used.

The flying lead variants will come with approximately 10-inch lead wires for easy installation. The detailed mounting dimensions, electrical schematic and stroke information is provided in Figures 25 to 28.

**Table 5. Hardware Requirements Per LVDT**

<b>SI No.</b>	<b>Description</b>	<b>Quantity</b>	<b>Applicable</b>
1	O-ring per AS568-113	1	Threaded configurations
2	O-ring per AS568-114	1	Flanged configurations
3	Back-up ring (Size -114)	2	Flanged configurations
4	Dowel pin	1	Flanged configurations
5	Front support. Recommended material: PEEK	1	All configurations



Figure 25. Dual-Tandem Dimensions mm [in]

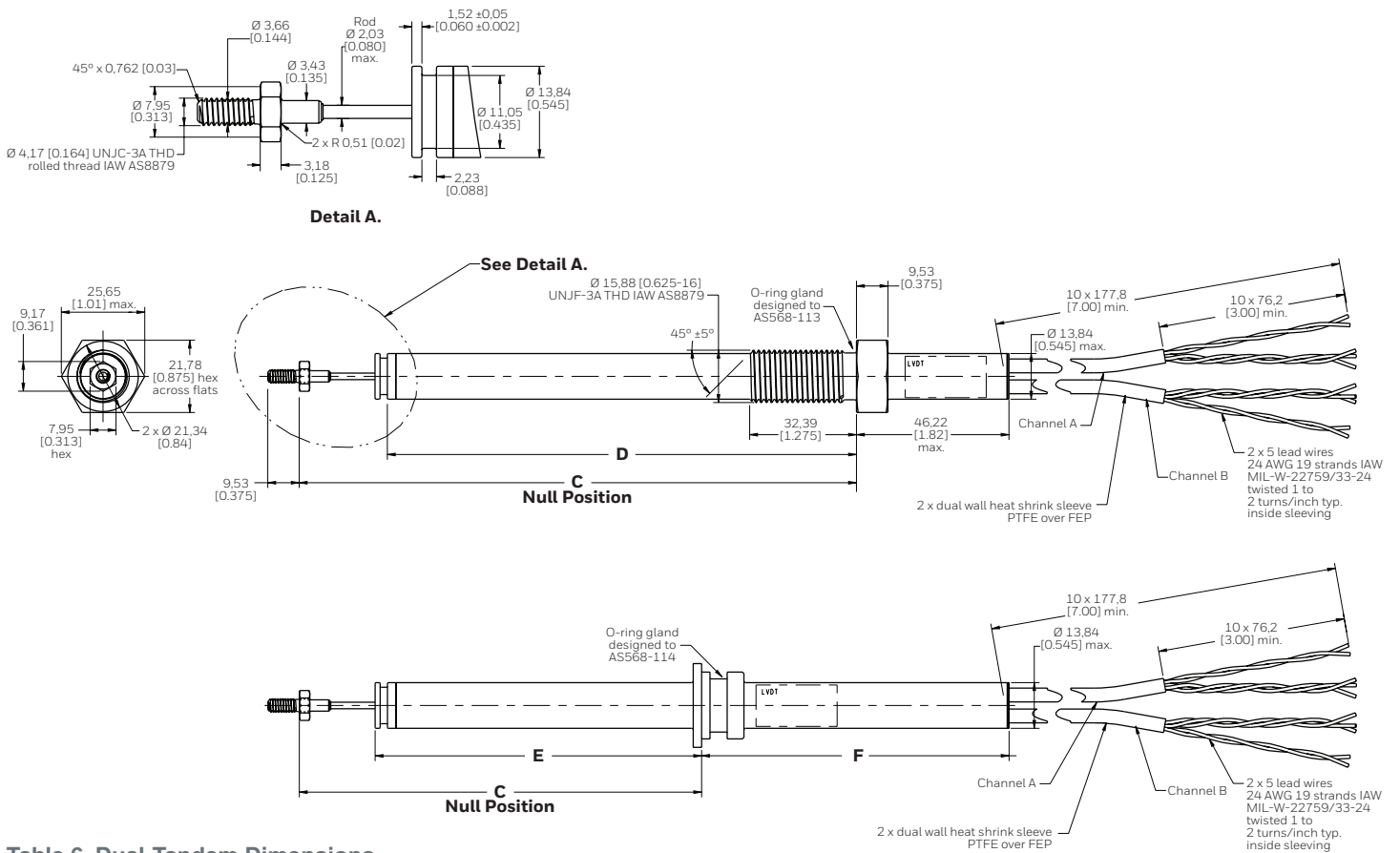


Table 6. Dual-Tandem Dimensions

Mounting Type	Catalog Listing	Total Electrical Stroke "A"	Total Mechanical Stroke "B"	Rig Position "C"	Front Housing Length for Threaded Config "D"	Front Housing Length for Flanged Config "E"	Rear Housing Length for Flanged Config "F"
Threaded	1LVT140ADB	35,56 mm [1.40 in]	36,07 mm [1.42 in]	168,96 mm [6.652 in]	142,24 mm [5.60 in]	-	-
Flanged	1LVT140BDB	35,56 mm [1.40 in]	36,07 mm [1.42 in]	121,97 mm [4.802 in]	-	95,25 mm [3.75 in]	93,22 mm [3.67 in] max.
Threaded	1LVT070ADB	17,78 mm [0.7 in]	18,29 mm [0.72 in]	138,73 mm [5.462 in]	122,43 mm [4.82 in]	-	-

Figure 26. Dual-Tandem Wiring

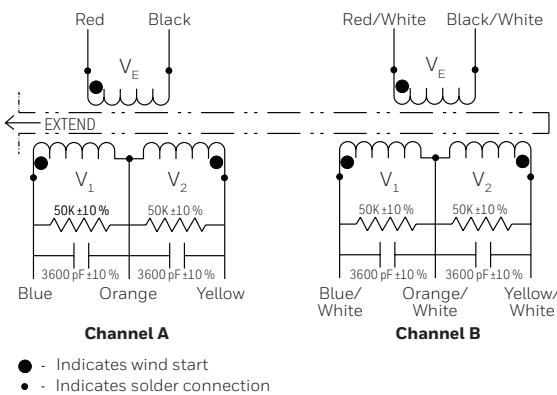


Figure 27. Dual-Tandem Stroke Definition

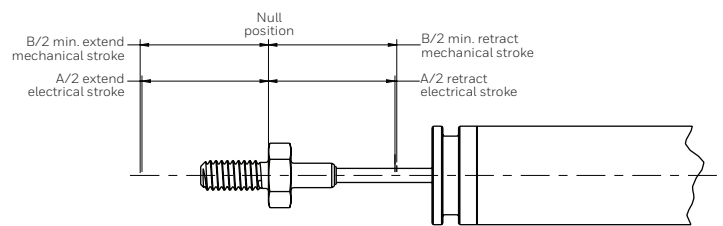
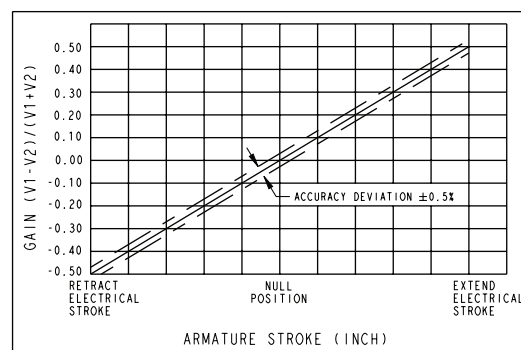


Figure 28. Dual-Tandem Gain vs. Stroke



## WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

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