

S-Series Displacement Transducers

Datasheet
502686
Issue 2.1

NEW



Features

- ▶ Digital options with 5 mm to 150 mm travel
- ▶ Analogue options with ± 2.5 mm to ± 75 mm travel
- ▶ $< 0.2\%$ Linearity FSO analogue option
- ▶ Rugged 19 mm diameter stainless steel body
- ▶ Rigid stainless steel carriers
- ▶ IP67 protection
- ▶ Improved range to body length ratio
- ▶ Digital, AC, DC and 4-20 mA options
- ▶ Large bore to core clearance
- ▶ Wide range of accessories

Description

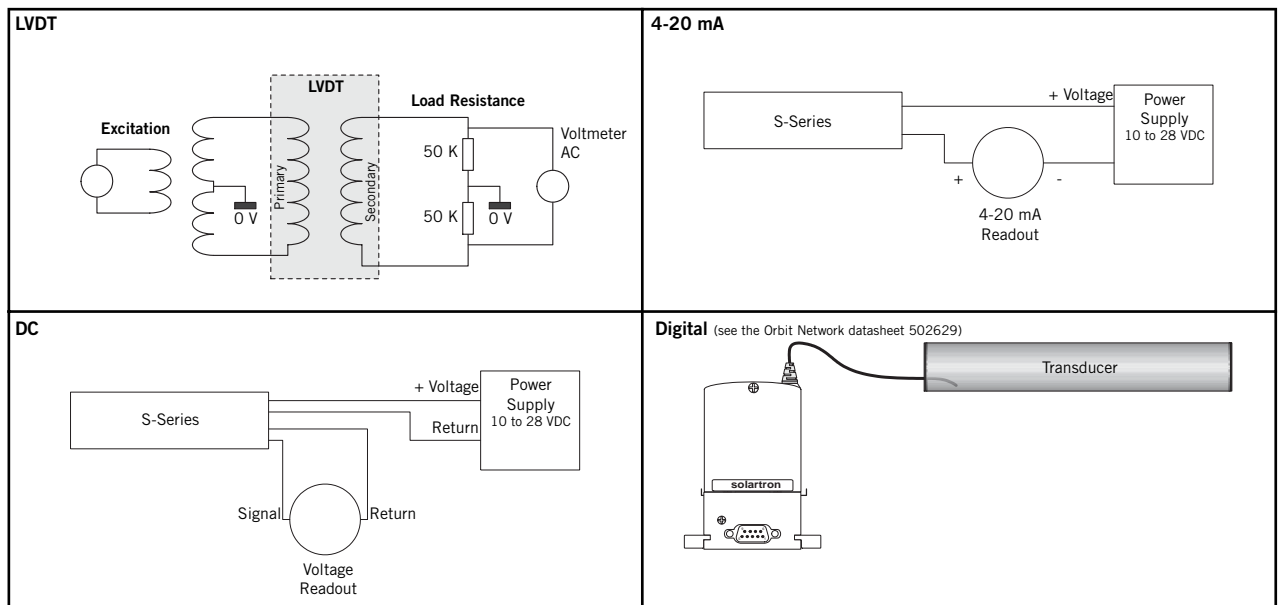
The S-Series of Displacement Transducers is the culmination of many years' experience gained from Solartron Metrology's highly successful Mach One range plus careful note of market feedback. The result is a totally new range of transducers that is better able to satisfy today's demanding manufacturing and research applications.

The need to transfer signals from the transducer to data acquisition and control systems reliably, quickly and cost effectively has been catered for with a complete new range of onboard or external analogue signal conditioning units and Orbit® compatible modules for digital versions.

The Stainless Steel body with improved sealing to IP67 coupled with new polymer guides with rigid carriers, ensure that the transducers keep working accurately and reliably, especially in wet and corrosive conditions.

An unusually large bore to core clearance is maintained throughout the range, even on transducers fitted with onboard signal conditioning, enabling easier installation and making the assembly more forgiving of misalignment.

Electrical Interface Connections



Technical Specification - Measurement Range ±2.5 to ±15 mm

Product Type	Analogue				Digital	Analogue				Digital	Analogue				Digital	Analogue				Digital					
	LVDT	±5 V	0-10 V	4-20 mA		LVDT	±5 V	0-10 V	4-20 mA		LVDT	±5 V	0-10 V	4-20 mA		LVDT	±5 V	0-10 V	4-20 mA		LVDT	±5 V	0-10 V	4-20 mA	
	Free Core	AS/2.5/F	VS/2.5/FB	VS/5/FU		IS/5/F		AS/5/F	VS/5/FB		VS/10/FU	IS/10/F		AS/7.5/F		VS/7.5/FB	VS/15/FU	IS/15/F			AS/10/F	VS/10/FB	VS/20/FU	IS/20/F	
Guided	AS/2.5/G	VS/2.5/GB	VS/5/GU	IS/5/G	DS/5/G	AS/5/G	VS/5/GB	VS/10/GU	IS/10/G	DS/10/G	AS/7.5/G	VS/7.5/GB	VS/15/GU	IS/15/G	DS/15/G	AS/10/G	VS/10/GB	VS/20/GU	IS/20/G	DS/20/G	AS/15/G	VS/15/GB	VS/30/GU	IS/30/G	DS/30/G
Guided with Spring	AS/2.5/S	VS/2.5/SB	VS/5/SU	IS/5/S	DS/5/S	AS/5/S	VS/5/SB	VS/10/SU	IS/10/S	DS/10/S	AS/7.5/S	VS/7.5/SB	VS/15/SU	IS/15/S	DS/15/S	AS/10/S	VS/10/SB	VS/20/SU	IS/20/S	DS/20/S	AS/15/S	VS/15/SB	VS/30/SU	IS/30/S	DS/30/S
Guided with Universal Joints	AS/2.5/U	VS/2.5/UB	VS/5/UU	IS/5/U	DS/5/U	AS/5/U	VS/5/UB	VS/10/UU	IS/10/U	DS/10/U	AS/7.5/U	VS/7.5/UB	VS/15/UU	IS/15/U	DS/15/U	AS/10/U	VS/10/UB	VS/20/UU	IS/20/U	DS/20/U	AS/15/U	VS/15/UB	VS/30/UU	IS/30/U	DS/30/U

Measurement																		
Measurement Range (mm)	±2.5	5			±5	10			±7.5	15			±10	20		±15	30	
Linearity ¹ (%FSO)														±0.2				
Resolution (µm)	see note ²			0.305	see note ²			0.61	see note ²			0.91	see note ²		1.22	see note ²		1.83
Pre-travel ³ (mm) ±0.5	1.25				2.25				0.85				2.45			5.95		
Post-travel ³ (mm) ±0.5	1.60				2.60				1.20				2.90			6.30		
Tip Force (N) ±20%	1.00				1.00				1.05				1.10			1.25		
Spring Rate (N/mm) ±20%	0.090				0.076				0.057				0.048			0.035		
Temperature Coefficient (%FSO/°C)	<0.02								<0.01									

Mechanical																				
Body Length (mm) ±0.5 (free core)	33.5	72.5		33.5	53	92		53	60.2	99.2		60.2	74.5	113.5		74.5	88.9	127.9		88.9
Body Length (mm) ±0.5 (guided)	55	94		55	74.5	113.5		74.5	81.7	120.7		81.7	96	135.0		96	110.4	149.4		110.4
Body Diameter (mm)														18.80 to 19.00						
Weight ⁴ (g) ±5 g	58	72		58	66	80		66	67	81		67	80	94		80	92	106		92
Core Weight ⁴ (g) ±1 g	2.6				5.0				5.8				7.2			6.4				

Electrical Interface - LVDT																	
Sensitivity (mV/V/mm) ±5%	144				178				121			76			60		
Energising Current (mA/V) ±5%	1.0				2.6				2.2			0.6			1.5		
Phase Shift														Not greater than 3 degrees			
Zero Phase Frequency (kHz)	5.1				4.9				6.1			5.5			7.4		
Residual Voltage at Null Position (%FSO)	<0.5				<0.5				<0.5			<0.5			<0.5		

Electrical Interface - DC & 4-20 mA	
Input Voltage	10 to 30 VDC
Output Ripple (%FSO)	0.02
Bandwidth	500 Hz (-3 dB)

Materials	
Case	300 series Stainless Steel
Cable	PFA
Core	Nickle / Iron

Environmental		
Storage Temperature	LVDT	-40°C to +120°C
	DC, 4-20 mA & Digital	-20°C to +85°C
Operating Temperature	LVDT	-40°C to +120°C
	DC & 4-20 mA	0°C to +65°C
	Digital	-40°C to +120°C
Sealing	LVDT, DC & 4-20 mA	IP67
	Digital (transducer only)	
Vibration	Sinusoidal Frequency Range	Amplitude
	10 to 50 Hz	1 to 10 g rms linear
	50 Hz to 1 kHz	10 g rms
Shock	Drop testing 1m onto a hard surface. Topple testing 10 times from each end onto hard surface.	

Digital Probe Interface Electronics (PIE)	
Reading Rate	Up to 3960 readings/second
Bandwidth	Up to 460Hz dependent on noise performance required
Output	Serial Communications RS485 Signal level (Solartron Orbit Protocol)
Storage Temperature	-20°C to +85°C
Operational Temperature	0°C to +60°C
Sealing	IP43

Notes
¹ The linearity and electrical specification of the LVDT version is valid for the following conditions: energised at 3 V ±1 V rms into a 100 k load resistance configured with the centre ground at an excitation frequency of 5 kHz ±500 Hz.
² Dependant on associated electronics.
³ Guided versions and spring versions only.
⁴ Free core versions only. Weight for Digital version is for probe only and excludes PIE.

Technical Specification - Measurement Range ± 25 to ± 75 mm

Product Type	Analogue				Digital	Analogue				Digital	Analogue				Digital
	LVDT	± 5 V	0-10 V	4-20 mA		LVDT	± 5 V	0-10 V	4-20 mA		LVDT	± 5 V	0-10 V	4-20 mA	
Free Core	AS/25/F	VS/25/FB	VS/50/FU	IS/50/F		AS/50/F	VS/50/FB	VS/100/FU	IS/100/F		AS/75/F	VS/75/FB	VS/150/FU	IS/150/F	
Guided	AS/25/G	VS/25/GB	VS/50/GU	IS/50/G	DS/50/G	AS/50/G	VS/50/GB	VS/100/GU	IS/100/G	DS/100/G	AS/75/G	VS/75/GB	VS/150/GU	IS/150/G	DS/150/G
Guided with Spring	AS/25/S	VS/25/SB	VS/50/SU	IS/50/S	DS/50/S	AS/50/S	VS/50/SB	VS/100/SU	IS/100/S	DS/100/S	AS/75/S	VS/75/SB	VS/150/SU	IS/150/S	DS/150/S
Guided with Universal Joints	AS/25/U	VS/25/UB	VS/50/UU	IS/50/U	DS/50/U	AS/50/U	VS/50/UB	VS/100/UU	IS/100/U	DS/100/U	AS/75/U	VS/75/UB	VS/150/UU	IS/150/U	DS/150/U

Measurement	± 25	50	± 50	100	± 75	150
Measurement Range (mm)	± 25	50	± 50	100	± 75	150
Linearity ¹ (%FSO)	± 0.2					
Resolution (μm)	see note ²		3.05	see note ²		9.15
Pre-travel ³ (mm) ± 0.5	6.15		4.25		4.35	
Post-travel ³ (mm) ± 0.5	6.60		4.6		4.7	
Tip Force (N) $\pm 20\%$	1.50		1.75		1.6	
Spring Rate (N/mm) $\pm 20\%$	0.031		0.021		0.012	
Temperature Coefficient (%FSO/°C)	<0.01				<0.015	

Mechanical	± 25		50		± 50		100		± 75		150	
Body Length (mm) ± 0.5 (free core)	110.4	149.4	110.4	168	207	168	218.2	257.2	218.2			
Body Length (mm) ± 0.5 (guided)	131.9	170.9	131.9	189.5	228.5	189.5	239.7	278.7	239.7			
Body Diameter (mm)	18.80 to 19.00											
Weight ⁴ (g) ± 5 g	110	124	110	153	167	153	167	181	167			
Core Weight ⁴ (g) ± 1 g	6.6			9.0								

Electrical Interface - LVDT	± 25	50	± 50	100	± 75	150
Sensitivity (mV/V/mm) $\pm 5\%$	21		15		10	
Energising Current (mA/V) $\pm 5\%$	0.5		0.6		2.5	
Phase Shift	not greater than 3 degrees					
Zero Phase Frequency (kHz)	6.2		4.7		6.8	
Residual Voltage at Null Position (%FSO)	<0.5		<0.5		<0.5	

Electrical Interface - DC & 4-20 mA	DC & 4-20 mA
Input Voltage	10 to 30 VDC
Output Ripple (%FSO)	0.02
Bandwidth	500 Hz (-3 dB)

Materials	Materials
Case	300 series Stainless Steel
Cable	PFA
Core	Nickle / Iron

Environmental	Environmental	Environmental
Storage Temperature	LVDT	-40°C to +120°C
	DC, 4-20 mA & Digital	-20°C to +85°C
Operating Temperature	LVDT	-40°C to +120°C
	DC & 4-20 mA	0°C to +65°C
	Digital	-40°C to +120°C
Sealing	LVDT, DC & 4-20 mA	IP67
	Digital (transducer only)	
Vibration	Sinusoidal Frequency Range	Amplitude
	10 to 50 Hz	1 to 10 g rms linear
	50 Hz to 1 kHz	10 g rms
Shock	Drop testing 1m onto a hard surface. Topple testing 10 times from each end onto hard surface.	

Digital Probe Interface Electronics (PIE)	Digital Probe Interface Electronics (PIE)
Reading Rate	Up to 3960 readings/second
Bandwidth	Up to 460Hz dependent on noise performance required
Output	Serial Communications RS485 Signal level (Solartron Orbit Protocol)
Storage Temperature	-20°C to +85°C
Operational Temperature	0°C to +60°C
Sealing	IP43

Notes

- ¹ The linearity and electrical specification of the LVDT version is valid for the following conditions: energised at 3 V ± 1 V rms into a 100 k load resistance configured with the centre ground at an excitation frequency of 5 kHz ± 500 Hz.
- ² Dependant on associated electronics.
- ³ Guided versions and spring versions only.
- ⁴ Free core versions only. Weight for Digital version is for probe only and excludes PIE.

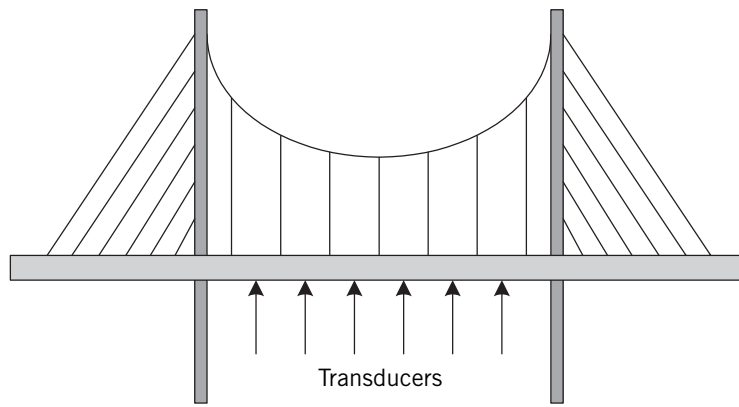


Figure 1
Long term measurement of deformation of a bridge structure

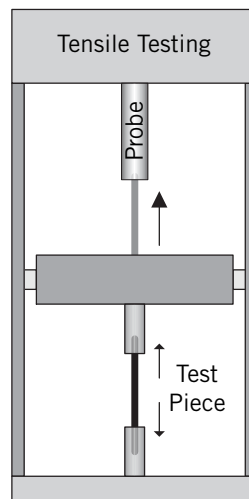


Figure 2
Monitoring the extension of a specimen in a tensile testing machine

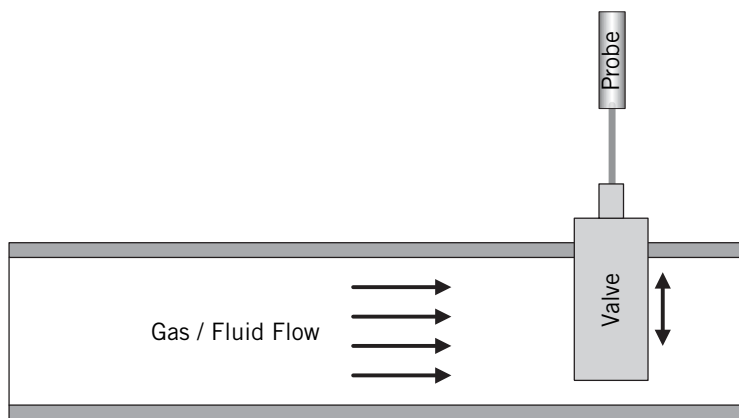
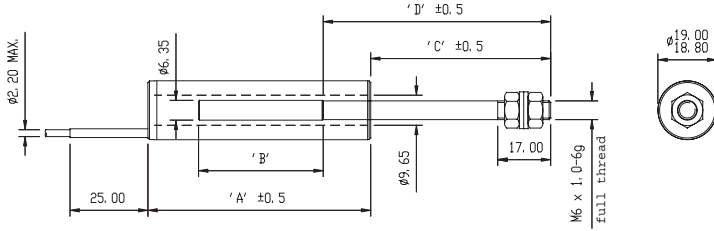


Figure 3
Monitoring the valve position and providing a feedback control signal for regulating the gas / fluid flow

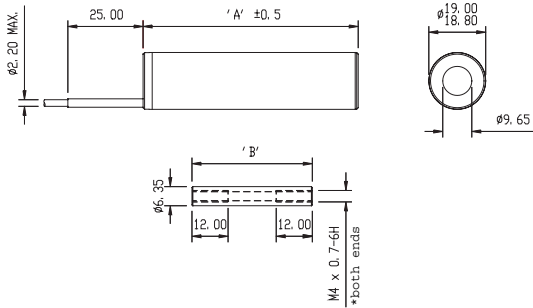
Mechanical Drawings

S-Series - free core and carrier



Transducer Type	'A' mm Body length	'B' mm Core length	'C' mm at null	'D' mm
AS/2.5/F	33.5	16.5	40.5	47.0
AS/5/F	53.0	29.0	48.0	58.0
AS/7.5/F	60.2	34.0	50.9	62.0
AS/10/F	74.5	40.0	57.75	73.0
AS/15/F	88.9	37.5	67.3	91.0
AS/25/F	110.4	38.5	80.05	114.0
AS/50/F	168.0	50.0	115.0	172.0
AS/75/F	218.2	50.0	160.9	243.0
VS/2.5/FB, VS/5/FU, IS/5/F	72.5	16.5	40.5	47.0
VS/5/FB, VS/10/FU, IS/10/F	92.0	29.0	48.0	58.0
VS/7.5/FB, VS/15/FU, IS/15/F	99.2	34.0	50.9	62.0
VS/10/FB, VS/20/FU, IS/20/F	113.5	40.0	57.75	73.0
VS/15/FB, VS/30/FU, IS/30/F	127.9	37.5	67.3	91.0
VS/25/FB, VS/50/FU, IS/50/F	149.4	38.5	80.05	114.0
VS/50/FB, VS/100/FU, IS/100/F	207.0	50.0	115.0	172.0
VS/75/FB, VS/150/FU, IS/150/F	257.2	50.0	160.9	243.0

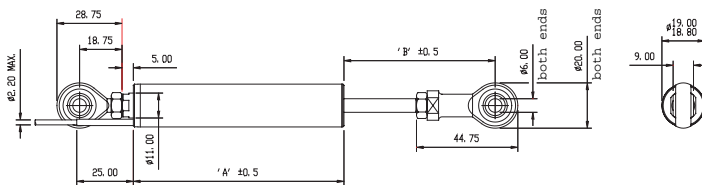
S-Series - free core



Transducer Type	'A' mm Body length	'B' mm Core length
AS/2.5/F	33.5	16.5
AS/5/F	53.0	29.0
AS/7.5/F	60.2	34.0
AS/10/F	74.5	40.0
AS/15/F	88.9	37.5
AS/25/F	110.4	38.5
AS/50/F	168.0	50.0
AS/75/F	218.2	50.0
VS/2.5/FB, VS/5/FU, IS/5/F	72.5	16.5
VS/5/FB, VS/10/FU, IS/10/F	92.0	29.0
VS/7.5/FB, VS/15/FU, IS/15/F	99.2	34.0
VS/10/FB, VS/20/FU, IS/20/F	113.5	40.0
VS/15/FB, VS/30/FU, IS/30/F	127.9	37.5
VS/25/FB, VS/50/FU, IS/50/F	149.4	38.5
VS/50/FB, VS/100/FU, IS/100/F	207.0	50.0
VS/75/FB, VS/150/FU, IS/150/F	257.2	50.0

*12 mm dimensions not applicable for AS/2.5/F, VS/2.5/F, VS/5/FU & IS/5/F

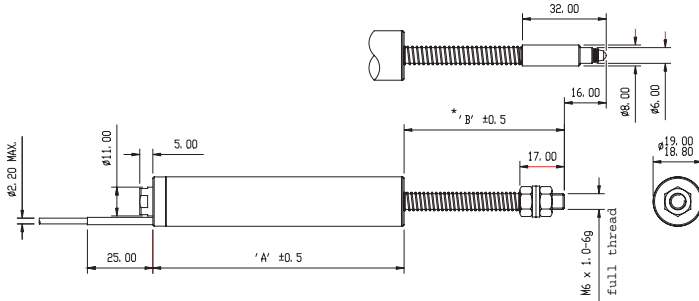
S-Series - guided with universal joints



Transducer Type	'A' mm Body length	'B1' mm Fully Extended	'B2' mm at null	'B3' mm Fully Retracted
AS/2.5/U, DS/5/U	55.0	53.25	49.5	45.4
AS/5/U, DS/10/U	74.5	64.25	57.0	49.4
AS/7.5/U, DS/15/U	81.7	68.25	59.9	51.2
AS/10/U, DS/20/U	96.0	79.25	66.8	53.9
AS/15/U, DS/30/U	110.4	97.25	76.3	55.0
AS/25/U, DS/50/U	131.9	120.25	89.1	57.5
AS/50/U, DS/100/U	189.5	178.25	124.0	69.4
AS/75/U, DS/150/U	239.7	249.25	169.9	90.2
VS/2.5/UB, VS/5/UU, IS/5/U	94.0	53.25	49.5	45.4
VS/5/UB, VS/10/UU, IS/10/U	113.5	64.25	57.0	49.4
VS/7.5/UB, VS/15/UU, IS/15/U	120.7	68.25	59.9	51.2
VS/10/UB, VS/20/UU, IS/20/U	135.0	79.25	66.8	53.9
VS/15/UB, VS/30/UU, IS/30/U	149.4	97.25	76.3	55.0
VS/25/UB, VS/50/UU, IS/50/U	170.9	120.25	89.1	57.5
VS/50/UB, VS/100/UU, IS/100/U	228.5	178.25	124.0	69.4
VS/75/UB, VS/150/UU, IS/150/U	278.7	249.25	169.9	90.2

Mechanical Drawings (cont.)

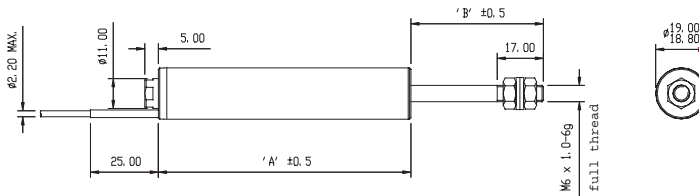
S-Series - guided spring push



Transducer Type	'A' mm Body length	'B1' mm Fully Extended	'B2' mm at null	'B3' mm Fully Retracted
AS/2.5/S, DS/5/S	55.0	35.25	31.5	27.4
AS/5/S, DS/10/S	74.5	46.25	39.0	31.4
AS/7.5/S, DS/15/S	81.7	50.25	41.9	33.2
AS/10/S, DS/20/S	96.0	61.25	48.8	35.9
AS/15/S, DS/30/S	110.4	79.25	58.3	37.0
AS/25/S, DS/50/S	131.9	102.25	71.1	39.5
AS/50/S, DS/100/S	189.5	160.25	106.0	51.4
AS/75/S, DS/150/S	239.7	231.25	151.9	72.2
VS/2.5/SB, VS/5/SU, IS/5/S	94.0	35.25	31.5	27.4
VS/5/SB, VS/10/SU, IS/10/S	113.5	46.25	39.0	31.4
VS/7.5/SB, VS/15/SU, IS/15/S	120.7	50.25	41.9	33.2
VS/10/SB, VS/20/SU, IS/20/S	135.0	61.25	48.8	35.9
VS/15/SB, VS/30/SU, IS/30/S	149.4	79.25	58.3	37.0
VS/25/SB, VS/50/SU, IS/50/S	170.9	102.25	71.1	39.5
VS/50/SB, VS/100/SU, IS/100/S	228.5	160.25	106.0	51.4
VS/75/SB, VS/150/SU, IS/150/S	278.7	231.25	151.9	72.2

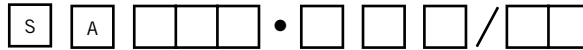
*for spring push with tip add 16.0 mm

S-Series - guided



Transducer Type	'A' mm Body length	'B1' mm Fully Extended	'B2' mm at null	'B3' mm Fully Retracted
AS/2.5/G, DS/5/G	55.0	35.25	31.5	27.4
AS/5/G, DS/10/G	74.5	46.25	39.0	31.4
AS/7.5/G, DS/15/G	81.7	50.25	41.9	33.2
AS/10/G, DS/20/G	96.0	61.25	48.8	35.9
AS/15/G, DS/30/G	110.4	79.25	58.3	37.0
AS/25/G, DS/50/G	131.9	102.25	71.1	39.5
AS/50/G, DS/100/G	189.5	160.25	106.0	51.4
AS/75/G, DS/150/G	239.7	231.25	151.9	72.2
VS/2.5/GB, VS/5/GU, IS/5/G	94.0	35.25	31.5	27.4
VS/5/GB, VS/10/GU, IS/10/G	113.5	46.25	39.0	31.4
VS/7.5/GB, VS/15/GU, IS/15/G	120.7	50.25	41.9	33.2
VS/10/GB, VS/20/GU, IS/20/G	135.0	61.25	48.8	35.9
VS/15/GB, VS/30/GU, IS/30/G	149.4	79.25	58.3	37.0
VS/25/GB, VS/50/GU, IS/50/G	170.9	102.25	71.1	39.5
VS/50/GB, VS/100/GU, IS/100/G	228.5	160.25	106.0	51.4
VS/75/GB, VS/150/GU, IS/150/G	278.7	231.25	151.9	72.2

Ordering Guide - LVDT S-Series



Series Type

A -40°C to 120°C rated, axial cable outlet, 5 kHz

Total Measurement Range

x x x • **y** x = millimetres • y = 1/10 millimetres

Core / Carrier Type

- M** Ø6.35 mm core - M4 x 0.7 thread
- P** Guided core / carrier plus spring - M6 x 1.0 thread
- S** Guided core / carrier - M6 x 1.0 thread
- T** Free core / carrier - M6 x 1.0 thread
- U** Guided core / carrier with 6 mm universal joints
- V** Guided core / carrier plus spring and tip

Electrical Connections

- B** BICM fitted*
- C** 5 core PFA cable - 2.2Ø
- D** DIN free plug 5 way 240° screw lock

Cable Length

x x xx = cable length in metres (Solartron approval required for cable length of 5 m or above)
y z *when BICM fitted - y = cable length in metres between probe and BICM (no greater than 5 m)
 - z = cable length in metres after BICM (no greater than 9 m)

Ordering Guide - 4-20 mA S-Series



Series Type

- A** Axial cable outlet, 4-20 mA
- B** Axial cable outlet, 20-4 mA

Total Measurement Range

x x x x = millimetres

Core / Carrier Type

- M** Ø6.35 mm core - M4 x 0.7 thread
- P** Guided core / carrier plus spring - M6 x 1.0 thread
- S** Guided core / carrier - M6 x 1.0 thread
- T** Free core / carrier - M6 x 1.0 thread
- U** Guided core / carrier with 6 mm universal joints
- V** Guided core / carrier plus spring and tip

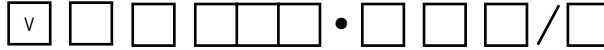
Electrical Connections

- C** 5 core PFA cable - 2.2Ø
- D** DIN free plug 3 way 180° screw lock

Cable Length

x x xx = cable length in metres (Solartron approval required for cable length of 10 m or above)

Ordering Guide - DC S-Series



Series Type

- B Bi-polar output
- U Uni-polar output

Output Voltage Range

- A Axial 5 VDC standard
- B Axial 10 VDC standard
- C Axial 5 VDC reversed
- D Axial 10 VDC reversed

Total Measurement Range

- x x x • y x = millimetres* • y = 1/10 millimetres

* only whole millimetres permitted for uni-polar transducers

Core / Carrier Type

- M Ø6.35 mm core - M4 x 0.7 thread
- P Guided core / carrier plus spring - M6 x 1.0 thread
- S Guided core / carrier - M6 x 1.0 thread
- T Free core / carrier - M6 x 1.0 thread
- U Guided core / carrier with 6 mm universal joints
- V Guided core / carrier plus spring and tip

Electrical Connections

- C 5 core PFA cable - 2.2Ø
- D DIN free plug 5 way 180° screw lock

Cable Length

- x x* = cable length in metres

* no greater than 3 metres permitted

Ordering Guide - Digital S-Series



Series Type

- A Axial

Total Measurement Range

- x x x x = millimetres

Core / Carrier Type

- P Guided core / carrier plus spring - M6 x 1.0 thread
- S Guided core / carrier - M6 x 1.0 thread
- U Guided core / carrier with 6 mm universal joints
- V Guided core / carrier plus spring and tip

Electrical Connections

- Z Solartron PIE Module (Orbit)

Cable Length

- x x xx* = cable length in metres

* no greater than 10 metres permitted



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