AMETEK®
ULTRA PRECISION TECHNOLOGIES

Solartron Metrology
Precision Driven

Displacement Sensors

Miniature Displacement Sensors
SM/MD/DF

SM

Description



SM Sensors cover two standard types in two measurement ranges; ±1 mm and ±3 mm. They are designed for measuring displacement in applications where infinite resolution and precise repeatability is required in a very small size. The coils are wound on a PPS (40% GL) former and housed in a stainless steel case. The epoxy bonded construction makes the device suitable for operation in wet and oily environments and in applications with high levels of mechanical stress. The core carrier assembly moves friction free within the sensor; an alternative option where the core is provided threaded at both ends is available, allowing the user to manufacture their own carrier interface. Recommended carrier material is titanium.

Features

Rugged construction
Short body length
Excellent performance

MD

Description



The small case diameter (6 mm and 8 mm) allows for easy installation in confined spaces. A right angle output facility is available as a retrofit for the 8 mm version. The low core weight makes this range ideal for use in low inertia systems. Cross talk is prevented by the screened cable, which also allows for multiple use of these sensors in close proximity.

Features

Small diameter
Right angle cable outlet option
Low core weight
Screened cable

DF

Description

The DF DC miniature displacement sensor has a friction-free core and the DFg has a free guided core incorporating Delrin bearings. All types incorporate a Linear Variable Differential Transformer (LVDT) as the measuring source together with oscillator, demodulator and filter providing a self-contained unit accepting a DC input and providing a DC output relative to armature position. With high linearity and low mass of moving parts, these are ideally suited to applications in civil, mechanical, chemical and production engineering. Also when mounted in a suitable load-sensitive member such as a proof ring or diaphragm, they can provide load or pressure measurement.



Features

Measurement range to 10 mm
High output
Excellent repeatability
Low power

LVDT Conditioning Electronics

Solartron Metrology offer a wide range of LVDT Conditioning Electronics and Readouts for use with SM and MD sensors, see separate datasheets for electronics and readouts.

Orbit® 3 Digital Sensors.

The guided SM range can be configured as Orbit® 3 Digital Transducers, this gives the user the ability to easily integrate these sensors with other Solartron or 3rd party sensors (such as load cells). For further information see the Orbit® 3 Measurement System datasheet.

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Technical Specification

Product Type	SM Type		MD Type					DF Type		
LVDT with Free Core	SM1	SM3	M6D1	MD1	MD2.5	MD5	MD10			
Half Bridge (HB) with Free Core			M6DH1	MD1H	MD2.5H	MD5H	MD10H			
DC Output with Free Core								DF1	DF2.5	DF5
DC Output with Guided Core								DFg1	DFg2.5	DFg5

Measurement										
Measurement Range (mm)	±1	±3	±1	±1	±2.5	±5	±10	±1	±2.5	±5
Linearity (% FSO)	0.25							0.30		
Linearity (% Reading)			0.5							
Resolution µm (Note 1)	<0.1		<0.1				<0.2	See Note 1		
Temperature Coefficients (%FSO/°C)	<0.03%		<0.01%					<0.025%		

Mechanical										
Body diameter (mm)	9.52		Φ6h6	Φ8h6				19.0		
Case Material	400 Stainless Steel									
Cable Type	PVC		PU							
Standard cable Length (m)	0.5		2					3		
Standard cable Style (Note 2)	A		B							
Nominal Mass (g)	6.0	8.0	2.6	5.0	7.6	8.5	13.0	26.0	26.0	30.0
Nominal Mass of Moving Parts (g)	0.5	1.5	0.1	0.2	0.2	0.3	0.7	1.0	1.0	1.2

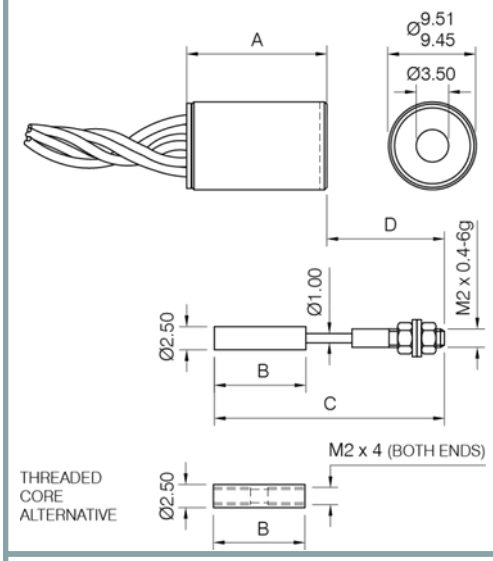
Environment			
Operating Temperature	-40 to +85	-10 to + 80	-5 to +70
Storage Temperature	-40 to +100	-40 to +105	-10 to + 80
Sealing	Splash Proof		

Electrical Interface										
Energising Voltage	1-10 (Vrms)		1-10 (Vrms)					10-24 (VDC)		
Energising (LVDT) Current at 5kHz (mA/V)	3.8	1.8	3.0	1.8	2.0	1.0	0.6			
Energising Current (HB) at 10kHz (mA/V)			1.2	1.0		1.2				
Energising Current DC at 10V (mA)								10		13
Frequency Response (-3db) Hz	Depends on Conditioning Electronics							50		75
Sensitivity at 10VDC ±10% mV/mm								750		540
Sensitivity at 5kHz ±5% mV/V/mm	142	136	269	210	150	105	33			
Sensitivity (HB) at 5kHz ±5% mV/V/mm			88	83	82	51	33			

Note 1: Resolution specification is only applicable to ORBIT digital transducers.
The resolution of LVDT transducers is effectively infinite and is only limited by the conditioning electronics

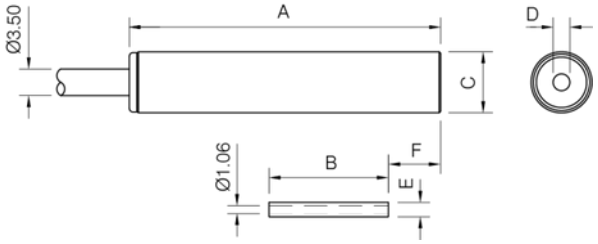
Note 2: Cable Style A comprises of individual twisted cores , Style B comprises a sheathed and screened cable

Dimensions



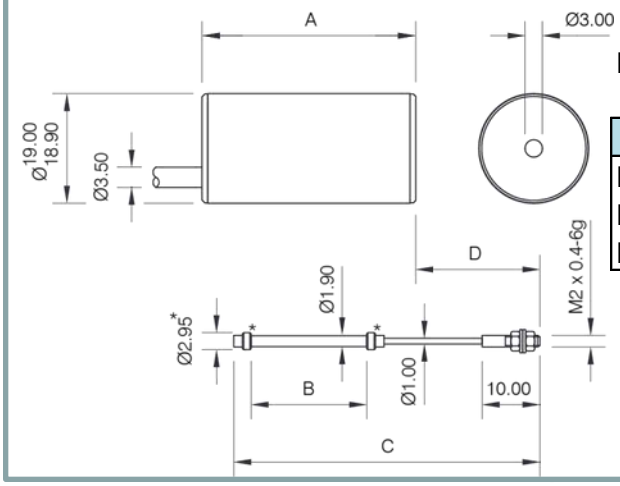
SM Series

Type	A	B	C	D (at Null)
SM1	15.20	9.90	24.90	12.70
SM3	35.00	20.60	42.60	15.30



MD Series

Type	A	B LVDT	B H/B	C	D	E	F(at null)
M6D1 / M6D1H	28.00	11.00	10.30	Ø6h6	Ø1.95	Ø1.60	2.00
MD1 / MD1H	28.00	11.00	8.85	Ø8h6	Ø2.20	Ø1.90	3.00
MD2.5 / MD2.5H	41.00	15.70	15.00	Ø8h6	Ø2.20	Ø1.90	6.90
MD5 / MD5H	49.00	21.20	18.40	Ø8h6	Ø2.20	Ø1.90	8.40
MD10 / MD10H	68.00	24.40	29.00	Ø8h6	Ø2.20	Ø1.90	16.40



DF SERIES

Type	A	B	C	D
DF1 / DFg1	37.0	20.0	53.0	21.5
DF2.5 / DFg2.5	37.0	20.0	53.0	21.5
DF5 / DFg5	43.0	24.3	57.3	20.5

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Solartron pursues a policy of continuous development. Specifications in this document may therefore be changed without notice.

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