

# Fiber Optic Displacement Sensors



**PRODUCT CATALOG**  
**March 2022**

**PHILTEC®**

# ANALOG SENSORS with VOLTAGE OUTPUT

Standard single channel units include amplifier and sensor tip with 914 mm (3 Feet) long fiberoptic cable, require +12 VDC input power, and provide 0 to +5 volt analog output with DC - 20 KHz bandwidth.

<b>D MODELS REFLECTANCE DEPENDENT</b>		
MODEL	Operating Range	
	mm	MINCH
D6	1	40
D12	2	80
D20	1.25	50
D21	2	80
D47	5	200
D63	3	120
D64	6	240
D100	10	400
D125	15	600
D169	20	750
D170	30	1200
D171	50	2000
D240	76	3000



140 x 82 x 48 mm Enclosure  
With Barrier Terminal Block for  
Input Power and Output Signal

<b>RC MODELS REFLECTANCE COMPENSATED</b>		
MODEL	Operating Range	
	mm	MINCH
RC19	0.76	30
RC20	1.65	65
RC25	0.76	30
RC32	2	80
RC60	3.2	125
RC62	2	80
RC63	4	160
RC100	5.1	200
RC125	9	350
RC171	12.7	500
RC225	25	1000
RC290	41	1600

# DIGITAL SENSORS DISTANCE OUTPUT via RS232

mDMS sensors use RS232 communication with 5,000 samples/sec maximum data rate. The standard fiberoptic cable is 914 mm (3 Feet). All units include Philtec DMS Control Software for Sensor Setup and Data Collection.

<b>D MODELS REFLECTANCE DEPENDENT</b>		
MODEL	Operating Range	
	mm	MINCH
mDMS-D6	1.3	40
mDMS-D12	2	80
mDMS-D20	1.3	50
mDMS-D21	2	80
mDMS-D47	6	200
mDMS-D63	3	120
mDMS-D64	6	240
mDMS-D100	10	400
mDMS-D125	15	600
mDMS-D169	19	750
mDMS-D170	30	1200
mDMS-D171	50	2000
mDMS-D240	76	3000



140 x 61 x 33 mm enclosure  
Includes:  

- Universal AC/DC Power Adaptor
- Y Cable Adaptor for power input and signal output
- RS232 Cable
- RS232 to USB Adapter
- DMS Control Software

<b>RC MODELS REFLECTANCE COMPENSATED</b>		
MODEL	Operating Range	
	mm	MINCH
mDMS-RC19	0.76	30
mDMS-RC20	1.5	65
mDMS-RC25	0.76	30
mDMS-RC32	2	80
mDMS-RC60	3.2	125
mDMS-RC62	2	80
mDMS-RC63	4	160
mDMS-RC100	5	200
mDMS-RC125	9	350
mDMS-RC171	12.7	500
mDMS-RC225	25	1000
mDMS-RC290	41	1600



## DIGITAL SENSORS

### DISTANCE OUTPUT via USB

muDMS sensors use USB communication with 5,000 samples/sec maximum data rate. The standard fiberoptic cable is 914 mm (3 Feet). All units include Philtec DMS Control Software for Sensor Setup and Data Collection.

D MODELS <i>REFLECTANCE DEPENDENT</i>		
MODEL	Operating Range	
	mm	MINCH
muDMS-D6	1	40
muDMS-D12	2	80
muDMS-D20	1.25	50
muDMS-D21	2	80
muDMS-D47	5	200
muDMS-D63	3	120
muDMS-D64	6	240
muDMS-D100	10	400
muDMS-D125	15	600
muDMS-D169	19	750
muDMS-D170	30	1200
muDMS-D171	50	2000
muDMS-D240	76	3000



- 140 x 82 x 48 mm enclosure  
Includes:
- Universal AC/DC Power Adaptor
  - mini-USB to standard USB adapter cable
  - DMS Control Software

RC MODELS <i>REFLECTANCE COMPENSATED</i>		
MODEL	Operating Range	
	mm	MINCH
muDMS-RC19	0.76	30
muDMS-RC20	1.65	65
muDMS-RC25	0.76	30
muDMS-RC32	2	80
muDMS-RC60	3.2	125
muDMS-RC62	2	80
muDMS-RC63	4	160
muDMS-RC100	5	200
muDMS-RC125	9	350
muDMS-RC171	12.7	500
muDMS-RC225	25	1000
muDMS-RC290	41	1600

## DIGITAL SENSORS

### DUAL CHANNEL UNITS

Two independent sensor channels in one enclosure. Can be any two D Models or any two RC models. D and RC models can not be combined in a two-channel enclosure. Includes both USB and RS232 outputs.

D MODELS <i>REFLECTANCE DEPENDENT</i>		
MODEL	Operating Range	
	mm	MINCH
mu2DMS-D6	1	40
mu2DMS-D12	2	80
mu2DMS-D20	1.25	50
mu2DMS-D21	2	80
mu2DMS-D47	5	200
mu2DMS-D63	3	120
mu2DMS-D64	6	240
mu2DMS-D100	10	400
mu2DMS-D125	15	600
mu2DMS-D169	19	750
mu2DMS-D170	30	1200
mu2DMS-D171	50	2000
mu2DMS-D240	75	3000



- 178 x 102 x 57 mm Enclosure  
Includes:
- Universal AC/DC Power Adaptor
  - USB Cable
  - RS232 Cable
  - Control Software

RC MODELS <i>REFLECTANCE COMPENSATED</i>		
MODEL	Operating Range	
	mm	MINCH
mu2DMS-RC19	0.76	30
mu2DMS-RC20	1.65	65
mu2DMS-RC25	0.76	30
mu2DMS-RC32	2	80
mu2DMS-RC60	3.2	125
mu2DMS-RC62	2	80
mu2DMS-RC63	4	160
mu2DMS-RC100	5	200
mu2DMS-RC125	9	350
mu2DMS-RC171	12.7	500
mu2DMS-RC225	25	1000
mu2DMS-RC290	40	1600

# SENSOR OPTIONS

FOR ANALOG MODELS	FOR DIGITAL MODELS	OPTION CODE	FEATURE
√	N/A	A1	PROVIDES TEMPERATURE STABILIZED ELECTRONICS FOR LOW DRIFT & HIGH ACCURACY
N/A	√	A2	PROVIDES LOW SPEED ANALOG OUTPUTS FOR μDMS SENSORS
√	√	B	CONNECTORIZES SENSOR SYSTEM WITH FINGER TIGHT IN-LINE CONNECTOR. (D6, RC12 n/a). <b>*OPTION B IS ALSO REQUIRED FOR USE WITH VACUUM PASSTHRU FLANGES &amp; ASSEMBLIES BV2, BV3, BV4, BVF</b>
√	√	Bw	CONNECTORIZES SENSOR SYSTEM WITH WRENCH TIGHT IN-LINE CONNECTOR.
√	√	2B	CONNECTORIZES SENSOR SYSTEM WITH TWO IN-LINE CONNECTORS. NOT AVAILABLE FOR ALL MODELS.
√	√	B1	CONNECTORIZES SENSOR SYSTEM WITH BULKHEAD CONNECTOR (D6, RC12 n/a)
√	√	Bv1	CONNECTORIZES SENSOR SYSTEM WITH SINGLE CHANNEL VACUUM PASSTHRU HARDWARE FOR 10 E-7 TORR. INCLUDES ULTRA-TORR COMPRESSION FITTING (D6, RC12 n/a)
√	√	Bv1-C133	SAME AS Bv1 WITH Ø 1.33" MINI-CF FLANGE FOR BULKHEAD MOUNTING
√	√	Bv1-C275	SAME AS Bv1 WITH Ø 2.75" CF FLANGE FOR BULKHEAD MOUNTING
√	√	Bv1-K25	SAME AS Bv1 WITH KF25 FLANGE FOR BULKHEAD MOUNTING
√	√	Bv1-K50	SAME AS Bv1 WITH KF50 FLANGE FOR BULKHEAD MOUNTING
√	√	Bv2	2 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS UP TO 10 E-11 TORR, Ø 2.75" CF (D6 n/a) <b>*ALSO REQUIRES OPTION B</b>
√	√	Bv3	3 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR RC MODELS FOR 10 E-11 TORR, Ø 3.375 CF (RC12, RC19, RC20 n/a), <b>*ALSO REQUIRES OPTION B</b>
√	√	Bv4	4 PORT DUAL CHANNEL VACUUM PASSTHRU FLANGE FOR TWO D MODELS UP TO 10 E-11 TORR, Ø 3.375 CF (D6 n/a) <b>*ALSO REQUIRES OPTION B</b>
√	√	BvF	MULTI-CHANNEL VACUUM PASSTHRU ASSEMBLY FOR 10 E-7 TORR. Ø 6" CF OR ISO-100 K FLANGE, CAN HAVE 8 D TYPE OR 5 RC TYPE SENSORS. (D6, RC12, RC19 & RC20 n/a) <b>*ALSO REQUIRES OPTION B</b>
√	√	--	STANDARD JACKET: PVC/MONOCOIL - PVC OVER A STEEL HELICAL WINDING. GOOD FLEXIBILITY, SEMI-CRUSH-PROOF, LIQUID-TIGHT, NOT VACUUM NOR MRI COMPATIBLE. GOOD TO 105C.
√	√	C1	JACKET: INTERLOCKING STAINLESS STEEL - FLEXIBLE, CRUSH PROOF, NOT LIQUID TIGHT. GOOD TO 850C.
√	√	C2	JACKET: SILICONE-FIBERGLASS OVER STEEL MONOCOIL - FLEXIBLE, SEMI-CRUSH-PROOF. EXCELLENT FLEX LIFE AND RESISTANCE TO FATIGUE, RADIATION RESISTANT. GOOD TO 220C,
√	√	C3	JACKET: SILICONE-FIBERGLASS ONLY - FLEXIBLE, NOT CRUSH-PROOF. EXCELLENT FLEX LIFE AND RESISTANCE TO FATIGUE, RADIATION RESISTANT. GOOD TO 220C,
√	√	C5	JACKET: PVC/SS INTERLOCK - EXCELLENT PLIABILITY, RESISTS LATERAL PRESSURE, TWISTING AND PULLING. DOES NOT STRETCH, WITHSTANDS REPEATED BENDING, GOOD TO 105C,
√	√	C6	JACKET: CONVOLUTED PTFE - SEMI-CRUSH-PROOF, VERY FLEXIBLE, VAPOR BARRIER, EMF & MRI COMPATIBLE. GOOD TO 260C.
√	√	C7	JACKET: PTFE TUBING - MRI & EMF COMPATIBLE, VAPOR BARRIER, POOR FLEXIBILITY. GOOD TO 260C.
√	√	C8	JACKET: PVC - VERY FLEXIBLE, NOT CRUSH-PROOF, LIQUID-TIGHT, EMF & MRI COMPATIBLE. GOOD TO 105C.
√	√	C9	JACKET: ANNEALED (semi-rigid) STAINLESS STEEL TUBING. LIQUID TIGHT. GOOD TO 850C.
√	√	C11	JACKET: POLYOLEFIN SHRINK TUBING - THIN WALL MOISTURE / VAPOR BARRIER, NOT CRUSH-PROOF, POOR FLEXIBILITY. GOOD TO 150C.
√	√	C12	JACKET: POLYOLEFIN OVER SS INTERLOK - THIN WALL MOISTURE / VAPOR BARRIER, CRUSH-PROOF, FLEXIBLE. GOOD TO 150C.
√	√	C13	JACKET: FURCATION TUBING- PVC / KEVLAR / PTFE. HIGH TENSILE STRENGTH FOR SENSORS < Ø2 MM. GOOD TO 85°C.
√	√	C14	JACKET: BRAIDED SS over PTFE. VERY POOR FLEXIBILITY, LIQUID TIGHT, GOOD FOR HIGH PRESSURE AND 200°C
√	√	E1	EXTRA LENGTH OF FIBEROPTIC CABLE, models D6 - D64 and RC19 - RC64
√	√	E2	EXTRA LENGTH OF FIBEROPTIC CABLE, models D100 - D171 and RC100 - RC225
√	√	E3	EXTRA LENGTH OF FIBEROPTIC CABLE, models D240 and RC290
√	√	Fv1	LOW VACUUM PASSTHRU FOR 10 E-4 TORR. PROVIDES Ø 0.375" X 3"L SOLID SECTION ON FO CABLE, COMPRESSION FITTING, AND STAINLESS STEEL INTERLOK SHEATHING ON VACUUM SIDE
√	√	Fv2	LOW VACUUM PASSTHRU, SAME AS Fv1, PROVIDES Ø 0.250" X 3"L SOLID SECTION ON FO CABLE
√	√	Fv3	LOW VACUUM PASSTHRU, SAME AS Fv1, PROVIDES Ø 0.500" X 3"L SOLID SECTION ON FO CABLE

# SENSOR OPTIONS

FOR ANALOG MODELS	FOR DIGITAL MODELS	OPTION CODE	FEATURE
√	N/A	G1	ADDITIONAL OUTPUT, DC COUPLED WITH 10x GAIN and ADJUSTABLE DC OFFSET
√	N/A	G2	ADDITIONAL OUTPUT, AC COUPLED WITH 10x GAIN
√	N/A	G3	ADDITIONAL OUTPUT, BINARY TTL OUTPUT 0/5 VOLTS
√	N/A	H1	HIGH FREQUENCY AMPLIFIER FOR D MODELS UP TO 200 KHZ BANDWIDTH
√	N/A	H2	HIGH FREQUENCY AMPLIFIER FOR D MODELS ABOVE 200 KHZ TO 1 MHZ BANDWIDTH
√	N/A	H3	HIGH FREQUENCY AMPLIFIER FOR RC MODELS UP TO 350 KHZ BANDWIDTH
√	N/A	+H1	ADDITIONAL OUTPUT FOR D MODELS WITH BANDWIDTHS UP TO 200 KHZ
√	N/A	+H2	ADDITIONAL OUTPUT FOR D MODELS WITH BANDWIDTHS EXCEEDING 200 KHz UP TO 1 MHZ
√	N/A	+H3	ADDITIONAL OUTPUT FOR RC MODELS WITH BANDWIDTHS UP TO 350 KHZ
√	N/A	L	LOW FREQUENCY AMPLIFIER ( < 20 KHz), 100 Hz STD
√	N/A	+L	ADDITIONAL OUTPUT WITH LOW FREQUENCY BANDWIDTH ( < 20 KHz), 100 Hz STD
√	N/A	M	DIGITAL DISPLAY - DC VOLTS
√	N/A	N	LOW NOISE AMPLIFIER (RC sensors only)
√	N/A	O	ADJUSTABLE DC OFFSET
√	N/A	P	POLYNOMIAL CURVE FIT TO SPECIFIED CALCULATION RANGE
√	√	Q	CONNECTORIZED AC/DC POWER ADAPTOR AND BNC OUTPUT
√	√	R1	AMBIENT LIGHT REJECTION AT 850 ±22 .5 nm
√	√	R2	BLUE LIGHT SENSOR, 470 nm
√	√	---	STANDARD STRAIGHT TIP: 200°C CONTINUOUS, 300°C INTERMITTENT
√	√	T1	TIP: STRAIGHT, CUSTOMIZED
√	√	T2	TIP: THREADED STANDARD SIZE. PLEASE RFQ FOR NON-STANDARD THREADS
√	√	T3	TIP: NON-METALLIC , (TORLON OR PEEK)
√	√	T4	TIP: 90° TUBING
√	√	T5	TIP: 90° SQUARE BODY, UNTHREADED END
√	√	T6	TIP: 90° SQUARE BODY, THREADED END
√	√	T7	TIP: MADE TO CUSTOMER SPECIFICATIONS
√	√	T8	TIP: HIGH TEMPERATURE, 250°C CONTINUOUS, 300°C INTERMITTENT
√	√	T9	TIP: HIGH TEMPERATURE, 350°C CONTINUOUS, 400°C INTERMITTENT
√	√	T10	TIP: HIGH TEMPERATURE, 900°F NO EPOXY, MECHANICALLY BONDED FIBERS
√	√	T10F	TIP: HIGH TEMPERATURE, 800°C FUSED-END QUARTZ FIBER (END FACE ONLY)
√	√	T11	TIP: NON-MAGNETIC (BRASS OR ALUMINUM)
√	√	T12	TIP: INVAR (LOW EXPANSION COEFFICIENT)
√	N/A	V	PROVIDES SENSOR AMPLIFIER WITH 0 - 10 VOLT OUTPUT
√	√	W	WINDOW: RECESSED SAPPHIRE EPOXIED INTO TIP FOR HIGH PRESSURE OR VACUUM
√	√	Wb	WINDOW: SAPPHIRE BRAZED TO SENSOR TIP FOR HIGH PRESSURE OR VACUUM please contact the factory

# CONNECTORS FOR FIBEROPTIC CABLES

## CONNECTOR ADVANTAGES

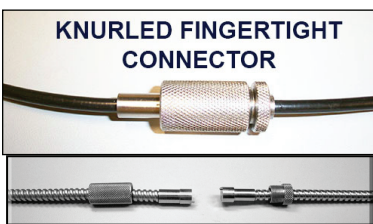
Connectors offer several advantages such as:

- Easy replacement of damaged tips
- Substitution of alternate tips
- Disconnect from sensor electronics
- Longer cable lengths

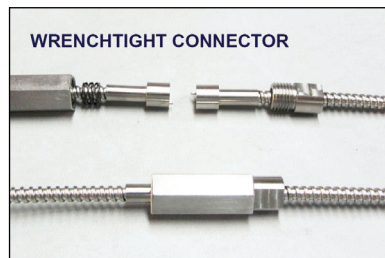
Sensors are available with three types of connectors:

- Option B or Bw ... in-line connectors
- Option B1 ... bulkhead mounted connectors.

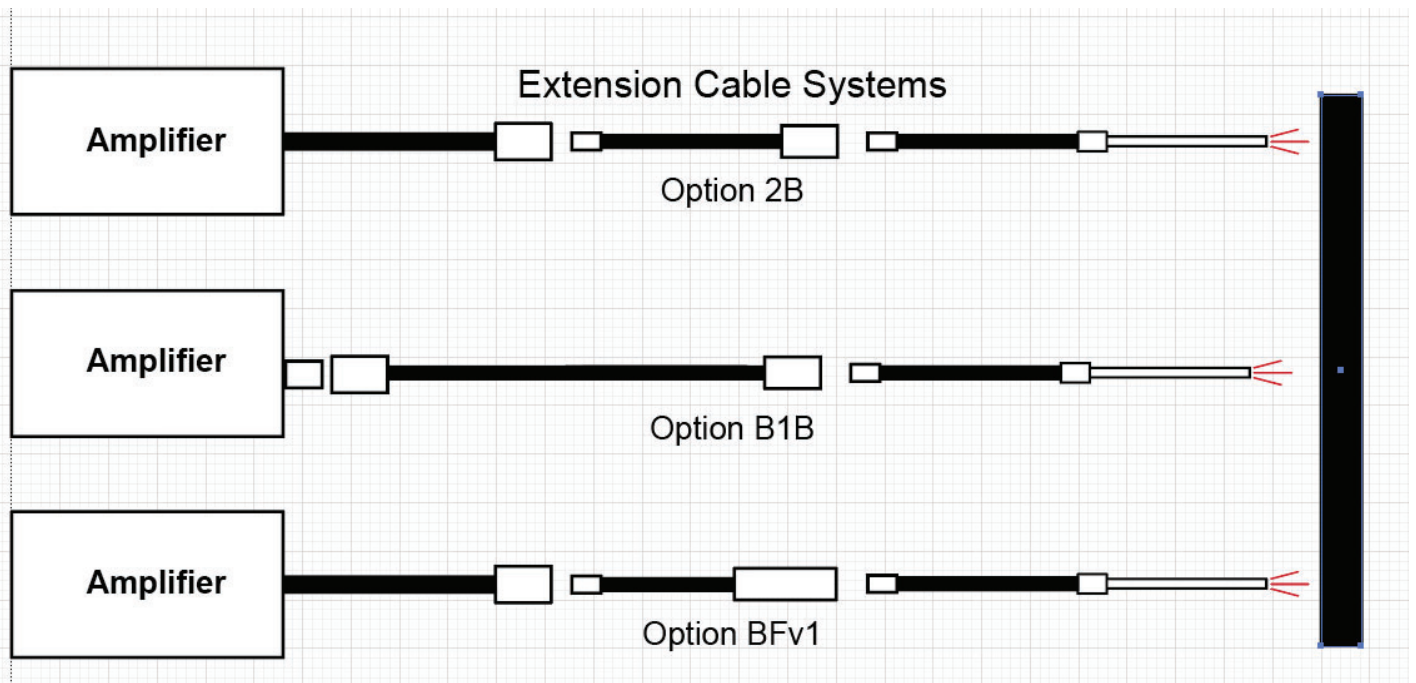
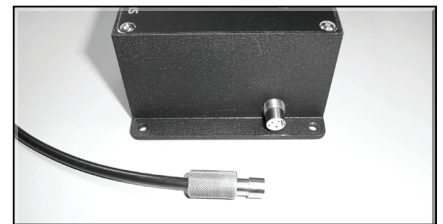
**B**



**Bw**

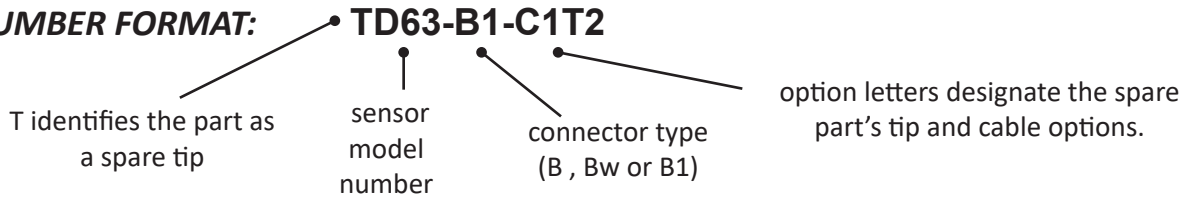


**B1**



# REPLACEABLE SENSOR TIPS

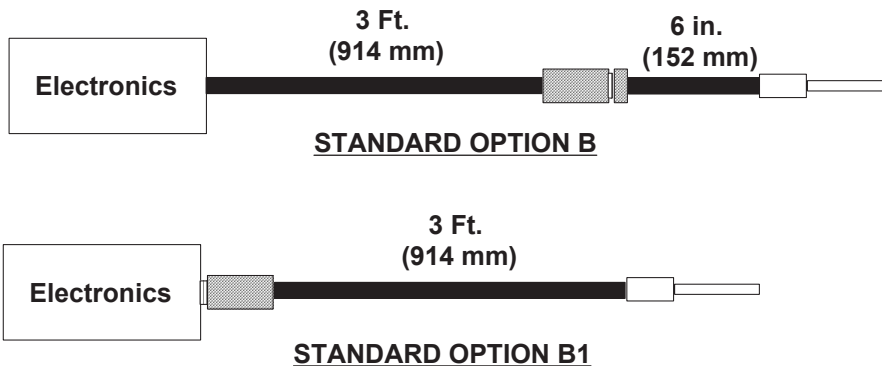
## MODEL NUMBER FORMAT:



## STANDARD LENGTHS

The standard lengths for spare tips are:

- 6" with Options B or Bw
- 3 Ft' with Option B1



## SPARE TIP NOTES

**1. All fiber optic cable lengths can be extended to fit the application.**

**2. Different model tips and electronics can not be mixed.**

A model D100 tip can only be used with a model D100 sensor package;  
a model RC100 tip can only be used with a model RC100 sensor package; etc.

**3. Noise Increases.** Custom tips can be provided using any combination of tip, sheathing and length options. However, there are tradeoffs to consider due to light losses at the connector interfaces. Connectorized sensors have increased noise levels (2 - 3 times higher).




**4. Use of connectorized fiberoptics with very dark targets is not recommended.**

D MODELS REFLECTANCE DEPENDENT	
MODEL	Connector
TD6, TD12	not available
TD20 - TD47	B, B1 or Bw
TD63 - TD125	B, B1 or Bw
TD170, TD171	B, B1 or Bw
TD240	B, B1 or Bw

RC MODELS REFLECTANCE COMPENSATED	
MODEL	Connector
TRC19, TRC20, TRC32, TRC60	B, B1 or Bw
TRC25, TRC62, TRC63	B, B1 or Bw
TRC100, TRC125	B, B1 or Bw
TRC171, TRC225	B, B1 or Bw
TRC290	B, B1 or Bw

# VACUUM PASSTHRU HARDWARE

Vacuum passthru hardware is available in a variety of packages from low to ultra-high vacuum, and for single and multi-channel applications.

MODEL or Option	SENSOR CHANNELS	SENSOR TYPE	TORR RATING	IMAGE
<b>Bv1</b>	Single	D or RC	10 <sup>-7</sup>	
<b>Bv1-C133</b> <b>Bv1-C275</b> <b>Bv1-K25</b> <b>Bv1-K50</b>	Single	D or RC	10 <sup>-7</sup>	
<b>Bv2</b>	Single	D	10 <sup>-11</sup>	
<b>Bv3</b>	Single	RC	10 <sup>-11</sup>	
<b>Bv4</b>	Dual	D	10 <sup>-11</sup>	
<b>BvF - CF</b>	Multi	D and RC	10 <sup>-7</sup>	
<b>BvF - ISO</b>	Multi	D and RC	10 <sup>-7</sup>	
<b>Fv1</b>	Single	D or RC	10 <sup>-4</sup>	
<b>Fv2</b>	Single	D or RC	10 <sup>-4</sup>	
<b>Fv3</b>	Single	D or RC	10 <sup>-4</sup>	
<b>W</b>	Single	D or RC	10 <sup>-7</sup>	
<b>Wb</b>	Single	D or RC	10 <sup>-11</sup>	



# ACCESSORIES & SERVICES

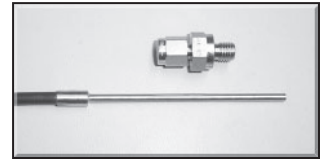
## SENSOR CALIBRATIONS

Sensors in the field can be returned to the factory for a gap calibration in air.  
Sensors can also be calibrated while submerged in a fluid sample provided by the customer.

- **SENSOR CALIBRATIONS IN AIR** ..... **Cal-A**
- **SENSOR CALIBRATIONS IN WATER OR FLUID** provided by customer..... **Cal-F**
- **NIST TRACEABLE CALIBRATIONS available on request**
- **Please send RFQ to factory for special calibrations**

## COMPRESSION FITTINGS

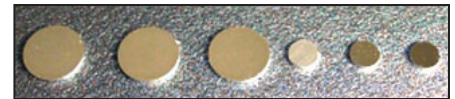
Swagelok fittings with nylon compression ferrules can be used to hold sensor tips and vacuum passthru fittings. Overall length is approx. 1.4". They mount into a straight threaded hole.



- for D47. Requires 5/16-24 threaded hole ..... **Model CF63**
- for D63, D64, D100, RC100. Requires 5/16-24 threaded hole ..... **Model CF125**
- for D169 - D171, RC171. Requires 3/8-24 threaded hole ..... **Model CF187**
- for Fv2. Requires 7/16-20 threaded hole ..... **Model CF250**
- for D240, RC190, RC290. Requires 1/2-20 threaded hole ..... **Model CF312**
- for Fv1, Requires 9/16-18 threaded hole ..... **Model CF375**
- for Fv3, Requires 3/4-16 threaded hole ..... **Model CF500**

## MIRRORED TARGET DISCS

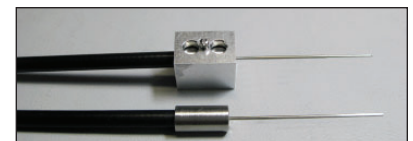
Type 316 stainless steel .032" thick with #8 mirror polish. When bonded to a target, these specimens present a smooth mirrored surface to optimize sensor performance.



- $\varnothing$  6.35 mm (1/4") Disc ..... **Model M25**
- $\varnothing$  12.7 mm (1/2") Disc ..... **Model M50**

## PROBE MOUNTING BLOCKS

Aluminum block for use with probes having a  $\varnothing$  1/4" or  $\varnothing$  3/16" collars. The block can be mounted on a linear stage to provide a fine adjustment of the sensor-to-target gap.



- for any model with  $\varnothing$  1/4" collared probes ..... **Model B25**
- for any model with  $\varnothing$  5/16" collared probes ..... **Model B31**

## MICRO-STAGES

These manual linear stages provide a fine adjustment (80 TPI).



- Single Axis Stage, 0.125" Travel for use with Model B25 Block ..... **Model MS-1**
- Single Axis Stage, 0.50" Travel for use with Model B31 Block ..... **Model MS-2**

# ACCESSORIES & SERVICES

## mini-DMS Y-CABLE POWER ADAPTORS

**Model PS-1** is required for operation of any mini-DMS sensor. Includes a universal AC/DC power supply and Y adaptor cable with D-sub female 9 pin (standard RS-232 connector) and 2.1 mm coax male power connector.

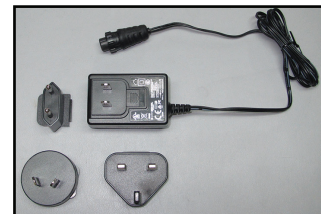


**PS-1**

**Model PS-U** ..... universal power supply for mini-DMS sensors (power supply only)

## Option Q POWER SUPPLY

**Model PS-Q** provides a 12 VDC, 500 ma universal AC/DC power supply terminated with Philtec's 3 Pin Weathertight Option Q Connector.



**PS-Q**

## USB To SERIAL RS-232 ADAPTOR CABLE

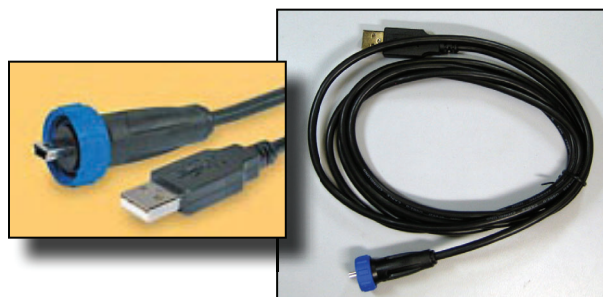
**Model ADB9** is a 500 Kbps High Speed Adaptor with 6 inch long cable, 9-pin Serial Male to USB Type A Male, USB 1.1 Compliant, Works with USB 1.1 & 2.0 ports. Requires Windows 98 SE, ME, 2000, XP, Vista, Windows 7



**ADB9**

## mini "B" to "A" USB Locking Connector

**model AUSB** is a 2 m long, robust dust and water-proof connection, fully shielded providing good levels of noise immunity and EMI protection. For use with muDMS sensors.



**AUSB**