

# OPTISCHE SENSORIK

Faseroptische Sensoren für  
Abstands- und Vibrationsmessungen

## OPTISCHE SENSORIK

In Zusammenarbeit mit der Firma Philtec bietet ROGA-Messtechnik das Programm "Optische Sensorik" exklusiv für Deutschland an.

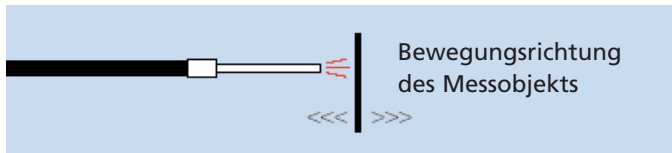
Die Produktpalette beinhaltet:

- Reflektions-gestützte D-Sensoren für Applikationen, bei denen sich das Messobjekt entlang der Sensorachse bewegt.
- Reflektionskompensierte RC-Sensoren für Anwendungen, bei denen das Messobjekt rotiert oder aus dem Sensorbereich herausbewegt wird.
- Vakuum Sensoren, die sich hervorragend für Wafer Abstands- und Positionsmessungen im Vakuum eignen. Sie stellen eine leistungsfähige Low-Cost-Alternative zur Laserinterferometrie dar.
- Die passende Elektronik für die analoge oder digitale Ausgabe der Daten. Digitale Abstandsmesssysteme (DMS = Displacement Measurement System) sind die beste Wahl für absolute Abstandsmessungen, Multiplexbetrieb und Prozesssteuerung. Dabei stehen Datenraten bis zu 5 kHz zur Verfügung. Linearisierter RS-232-Ausgang. Kalibrationsdaten werden onboard gespeichert.

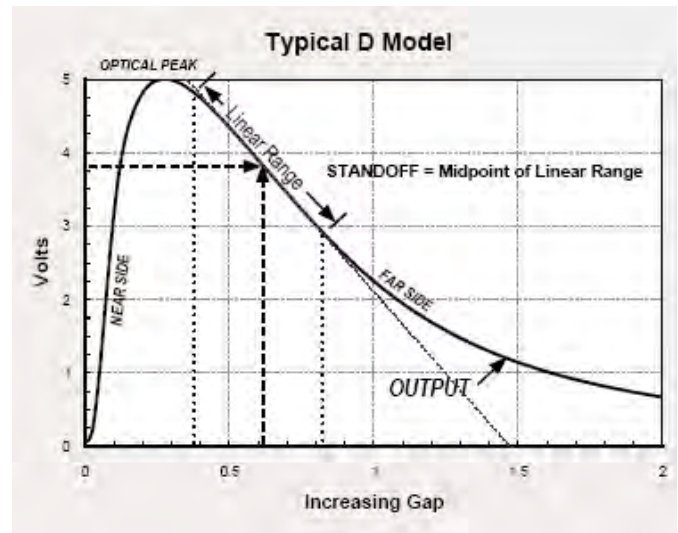
Alle Sensoren können nach Spezifikation des Kunden gefertigt werden.

### D SENSOREN (REFLEKTIONS-GESTÜTZT)

für Applikationen, bei denen sich das Messobjekt entlang der Sensorachse bewegt.



D-Sensoren bieten ein Ausgangssignal, das proportional zum Abstand und dem Reflektionsgrad der Oberfläche des Messobjekts ist. Die Ausgangsfunktion liefert zwei nutzbare Arbeitsbereiche: Im Nahbereichsbetrieb wird die höchste Auflösung erreicht, während bei größeren Arbeitsabständen hohe Empfindlichkeit in einem größeren Arbeitsbereich zur Verfügung steht.



### MODELLSPEZIFIKATIONEN

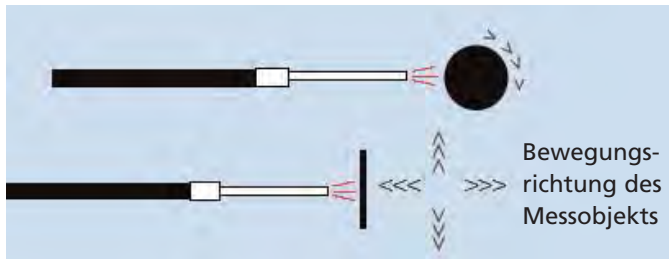
Merkmal	Einheit	D6	D12	D20	D21	D63	D64	D100	D125	D169	D170	D171
Spitzendurchmesser	mm	0,81	0,81	0,81	0,81	3,18	3,18	3,18	3,96	4,76	4,76	4,76
Arbeitsbereich	mm	1	2	1,3	2	3	6	10	15	20	30	50
	mils	40	80	50	80	125	250	400	800	800	1200	2000
Optischer Spitzenwert	mm	0,23	0,23	0,13	0,28	0,15	0,3	0,43	0,48	0,56	1	9,6
Nahbereichsbetrieb												
Abstand	mm	0,05	0,08	0,03	0,08	0,03	0,08	0,08	0,08	0,08	0,1	2,0
Linearer Bereich	mm	0,04	0,05	0,02	0,03	0,02	0,04	0,04	0,05	0,06	0,06	1,9
Empfindlichkeit	mv/μm	47	40	80	40	90	50	43	40	40	25	0,9
Auflösung bei 100Hz	μm	0,06	0,005	0,007	0,012	0,004	0,013	0,005	0,006	0,008	0,015	0,3
Auflösung bei 20kHz	μm	0,33	0,05	0,025	0,05	0,008	0,05	0,032	0,02	0,04	0,04	0,9
Auflösung bei 200kHz	μm	1,2	0,1	0,05	0,1	0,015	0,1	0,15	0,04	0,1	0,1	2,5
Betrieb mit größerem Arbeitsbereich												
Abstand	mm	0,43	0,53	0,3	0,7	0,66	1,1	2,0	2,1	2,5	4,8	15
Linearer Bereich	mm	0,23	0,48	0,25	0,4	0,76	1,4	2,5	2,9	3,5	6,4	6,1
Empfindlichkeit	mv/μm	5	3	8	3	2,8	1,6	0,8	0,6	0,5	0,3	0,3
Auflösung bei 100Hz	μm	0,1	0,04	0,06	0,15	0,12	0,5	0,75	0,25	0,43	1,2	1,7
Auflösung bei 20kHz	μm	1,3	,4	,25	0,6	,3	1,0	1,5	1,1	1,5	2,5	3
Auflösung bei 200kHz	μm	4	1,2	0,5	1,3	0,55	2,0	3,0	1,5	3,8	6,4	10

### TYPISCHE ANWENDUNGEN FÜR D SENSOREN

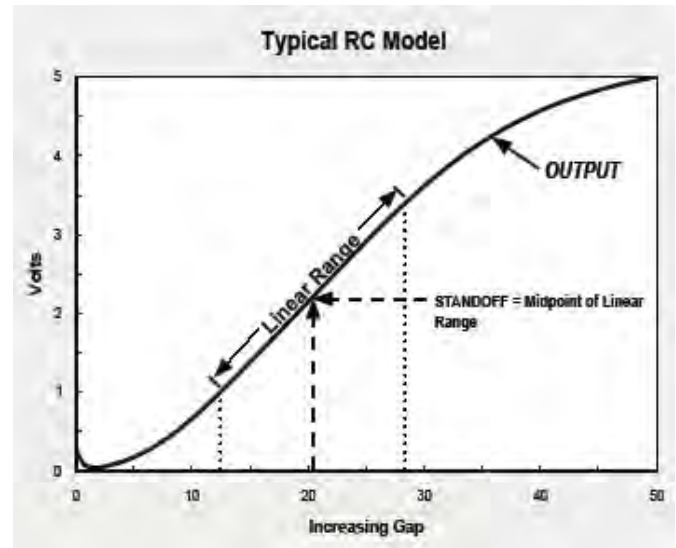
- Bewegungserfassung von Stellgliedern
- Vibrationen bei Lagern
- Auslenkung von Membranen
- Abstandsmessung in Flüssigkeiten
- Dyn. Untersuchungen an Kraftstoffeinspritzdüsen
- Eindring- und Schlagstudien
- Positionieren von Teilen
- Schwingungsuntersuchungen an Piezokristallen
- Kolbenpositionserfassung (TDC)
- Kolbenweg
- Erfassen von Kratzern
- Servosteuerung
- Spulenauslenkung
- Geschwindigkeitsmessung
- Messen struktureller Verformungen
- Erfassen der Oberflächengüte
- Vibrationsmessungen an Turbinenschaufeln
- Messen von Schwingungen im Ultraschallbereich
- Steuern von Prozessen im Vakuum
- Ventilkennlinien- und Ventilhubmessung

### RC SENSOREN (REFLEKTIONSKOMPENSIERT)

für Anwendungen, bei den das Messobjekt rotiert oder aus dem Sensorbereich herausbewegt wird.



RC Sensoren liefern ein Ausgangssignal, das proportional zum Abstand aber unabhängig vom Reflektionsgrad der Oberfläche des Messobjekts ist. Die Ausgangsfunktion bietet einen einzelnen Arbeitsbereich.



### MODELLSPEZIFIKATIONEN

Merkmal	Einheit	RC12	RC20	RC25	RC60	RC62	RC63	RC90	RC100	RC140	RC171	RC190
Spitzendurchmesser	mm	3,18	0,81	7,14	1,83	7,14	7,14	7,93	3,18	7,93	4,75	7,93
Faseroptische Fläche	mm	0,31 x 1,57	Ø 0,51	0,64 x 3,18	Ø 1,52	1,58 x 3,18	1,58 x 3,18	2,29 x 4,75	Ø 2,54	3,73 x 4,75	Ø 4,34	4,83 x 4,75
Bereich	mm	0,5	1,3	0,76	3,2	2	4	9	5	10	12,7	21
	mils	20	50	30	125	80	160	350	200	400	500	825
Abstand	mm	0,3	,51	0,3	1,5	1	1,4	3,8	2,2	7,5	5,6	12,4
Linearer Bereich	mm	0,09	0,4	0,2	1	,64	1,6	2,3	1,8	1,7	4,0	3,3
Empfindlichkeit	mv/µm	21	6	10	2,2	3	1,6	0,8	1,3	6	0,6	0,55
Auflösung bei 100Hz	µm	0,08	0,25	0,08	0,6	0,25	0,5	1	0,75	0,9	2,5	2,5
Auflösung bei 20kHz	µm	0,3	1	0,3	1,8	1	2	4	3	3,6	7,5	7,5
Auflösung bei 200kHz	µm	1	2	1	3,6	2	4	8	6	7,1	15	15

### TYPISCHE ANWENDUNGEN FÜR RC SENSOREN

- Automatische Teileuntersuchung
- Lager/Wellen-dynamische Messungen
- Kommutator-Profil
- Computer Festplattenmontage
- Verformungsstudien
- Abstand zu Glas / Papier
- Abstand zu Kunststoff
- Dynamische Ausdehnung
- Festplattendicke
- Prozesssteuerung
- Unrundheit von Wellen
- Wellenumlaufbahnen
- Erfassen struktureller Verformungen
- Messen der Oberflächengüte
- Dehnung und Schwingungen von Turbinenschaufeln
- Ultraschallschwingungen
- Anwendung im Ultrahochvakuum
- Schwingungsanalysen
- Verwindungen

### DAS ARBEITSPRINZIP

Licht wird aus einer Seite eines Faserbündels auf das Messobjekt projiziert. Das vom Messobjekt reflektierte Licht wird von zwei weiteren Faserbündeln aufgenommen und auf zwei voneinander unabhängigen Übertragungswegen dem Sensor zugeleitet. Mit einer Division wird der gemessene Abstand ermittelt. Er hängt nicht vom Reflektionsgrad der Oberfläche des Messobjekts ab. Deshalb werden die Sensoren als reflektionskompensiert bezeichnet.





### POSITIONSERFASSUNG IM VAKUUM

Die faseroptischen Abstandssensoren eignen sich hervorragend für Wafer Abstands- und Positionsmessungen im Vakuum. Sie arbeiten in einem breiten Temperaturbereich, sind in vollem Umfang für Applikationen im Vakuum geeignet, weisen geringste Abmessungen auf und bieten dabei Genauigkeiten im Sub-Mikron-Bereich. Sie stellen eine leistungsfähige Low-Cost-Alternative zur Laserinterferometrie dar. RC Sensoren liefern ein Ausgangssignal, das proportional zum Abstand aber unabhängig vom Reflektionsgrad der Oberfläche des Messobjekts ist. Die Ausgangsfunktion bietet einen einzelnen Arbeitsbereich.

### MEHRKANALIGE DURCHFÜHRUNG



Mehrkanalige Durchföhrung für bis zu  $10e^{-7}$  Torr

### DURCHFÜHRUNG IM ULTRAHOCHVAKUUM



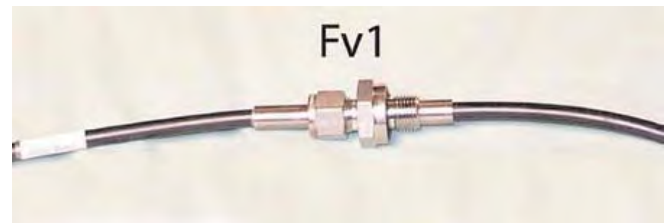
Einkanalige Ultrahochvakuum Durchföhrung für bis zu  $10e^{-11}$  Torr

### FENSTERAUFNEHMER



Fensteraufnehmer, nur die Spitze befindet sich im Vakuum, für bis zu  $10e^{-7}$  Torr

### DURCHFÜHRUNG IM NIEDRIGVAKUUM



Niedrigvakuumdurchföhrung für bis zu  $10e^{-3}$  Torr

### KUNDENSPEZIFISCHE AUSFÜHRUNGEN

In Zusammenarbeit mit Philtec ist ROGA-Instruments in der Lage die Spezifikationen und Anforderungen des Kunden umzusetzen. Nachfolgend finden Sie die beispielhafte Umsetzungen der jeweiligen Anforderung.



z.B.: lange, gerade Spitzen



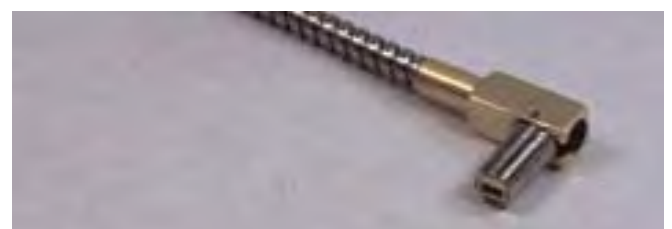
z.B.: gerade Spitzen mit Gewinde



z.B.: nicht-metallische Spitzen



z.B.: rechtwinkelige Spitzen mit rechteckigem Aufnehmerende



z.B.: rechtwinkelig abgewinkelte Spitzen mit rechteckigem Aufnehmerende und Gewinde

### ELEKTRONIK FÜR DIGITALE AUSGÄNGE

Digitale Abstandsmesssysteme (DMS = Displacement Measurement System) sind die beste Wahl für absolute Abstandsmessungen, Multiplexbetrieb und Prozesssteuerung. Dabei stehen Datenraten bis zu 5 kHz zur Verfügung. Linearisierter RS-232-Ausgang. Kalibrationsdaten werden onboard gespeichert. Verfügbar sind sowohl die D- als auch die RC-Modelle.

### STANDARD DMS



Standardmesssysteme können mit einzelnen oder zweifachen Sensoren arbeiten. Dazu gehört:

- Elektronik für RS-232-Kommunikation
- Tastatur/LC-Display für direkte Bedienung

### MINI-DMS



Minimesssysteme sind mit Einzelsensoren ausgestattet und werden ausschließlich über den PC betrieben.

### MEHRKANAL DMS



Das 10DMS Modulares Mehrkanal Rack nimmt beliebige Kombinationen von bis zu 10 Philtec Sensoren auf.

### ELEKTRONIK FÜR ANALOGE AUSGABE

Analoge Sensoren sind wegen ihrer kurzen Reaktionszeit ideal für das Messen von Relativbewegungen in dynamischen Applikationen geeignet. Sie sind jeweils als reflektionsgestützte sowie als reflektionskompensierte Sensoren verfügbar.



Abb.: D reflektions-gestützt (RC ähnlich)

- DC bis 20 kHz Bandbreite als Standardmodell
- DC bis 200 kHz Bandbreite oder höher optional verfügbar
- DC bis 100 Hz Bandbreite bieten die höchste Auflösung

Alle Abb. können vom Original leicht abweichen.

**PHILTEC**  
FIBEROPTIC SENSORS



D I S T A N C E | D I S P L A C E M E N T | V I B R A T I O N

Our 30<sup>th</sup> Year  
1985 - 2015

# ROGA-Instruments Product Catalog June 2016

**PHILTEC**

[www.philtec.com](http://www.philtec.com)

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*Fiberoptic Sensors for the Measurement of Distance, Displacement and Vibration*





**Custom Probes**



**Bluetooth Wireless Sensors**



**USB Powered Sensors**



**Analog Sensors**



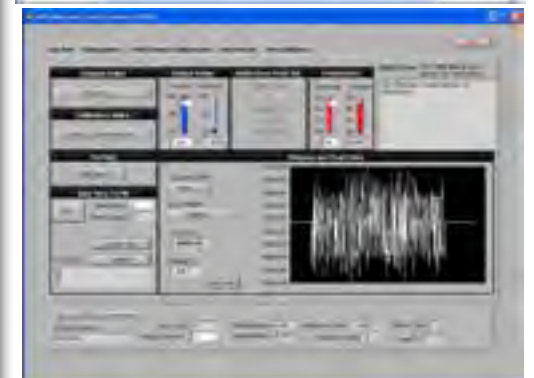
**Vacuum Passthru**



**Digital Sensors**

## How To Build A Sensor

1. Choose D or RC type
  - *based upon Direction of Target Motion*
2. Select Model Based Upon
  - *Range of Motion*
  - *Standoff Distance*
  - *Resolution*
  - *Target Spot Size*
3. Select Sensor Tip Design
4. Select Fiberoptic Cable Materials To Suit Application
5. Connectorize The System As Desired
6. Select Analog or Digital Output Package



**DMS Control Software**

# Foreward

*Thank you for your interest in our products.*

*Philtec has been providing innovative fiberoptic displacement sensing solutions since 1985.*

This catalog displays our standard sensor models and the many options for sensor tips, cables, connectors and electronics that have evolved from our experiences thru the years. In addition to those standard products and options:

**We Customize** Our engineers are happy to help design that special sensor system uniquely meeting your application requirements.

## PRODUCT HIGHLIGHTS

- **Operating Ranges 0 - 75 mm**
- **Bandwidths from DC to 1 MHz**
- **Sub-Micron Resolution**
- **Analog or Digital Output**
- **Interference Free**

### Principle of Operation

These are retro-reflective optical devices. The sensors use bundled glass or quartz fibers to transmit light to and receive reflected light from target surfaces. The intensity of the reflected light is processed to provide the distance between the sensor tip and a target surface.

Reflectance Dependent sensors (***D Models***) provide an output signal that is proportional to the target gap and also proportional to changes in reflectivity of the target surface.

Reflectance Compensated sensors (***RC Models***) provide an output signal proportional to the target gap only. They are blind to (independent of) changes in reflectivity of the target surface.



## ABOUT THE SENSORS

**GLASS FIBERS** are used for all applications from cryogenic to 480°C.

**QUARTZ FIBERS\*** are required for hot applications from 480°C to 800°C.

**EMITTED LIGHT** from fiber bundles diverges away from the probe tips

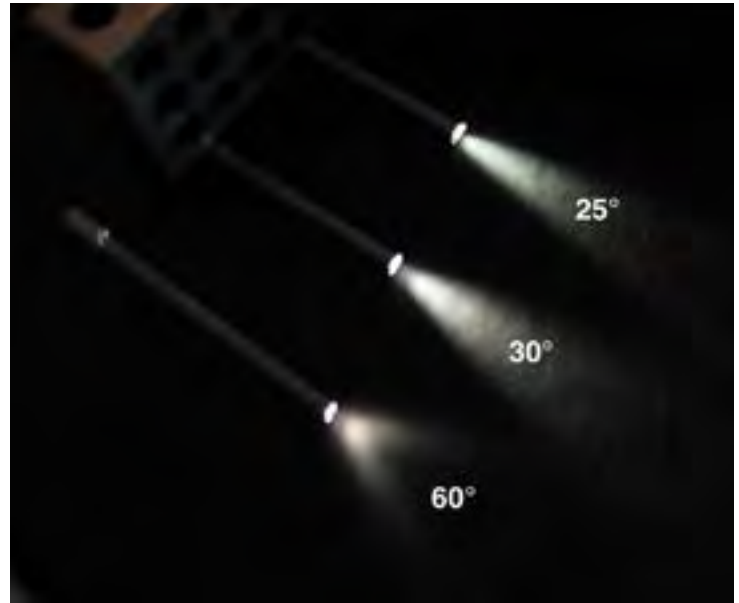
- Light intensity decays with increasing distance
- Sensors having the widest light beam spread generate the highest resolution
- Sensors having narrow light beams generate the largest operating range

### TARGET SPOT SIZE

- is equal to the area of the fiber bundle.
- Light rays diverging away from the probe are not reflected back into the probe.

### RED LIGHT vs. BLUE LIGHT

- 850 nm red LED light is standard.
- 470 nm blue LED light is optional.
- Blue light is required for hot targets >600°C.
- The reduced wavelength of Blue Light offers benefits with certain materials that absorb red light.
- Select *Option R2* for Blue Light



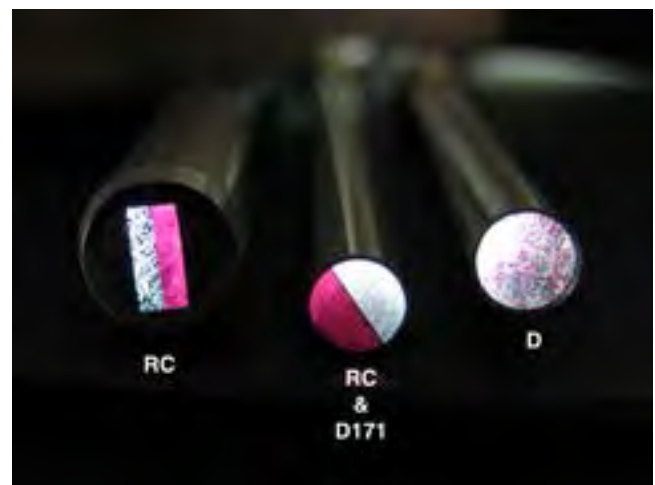
### FIBER MIX

*D models* have a random mix of transmitting and receiving fibers.

*D models* are always made with round fiber bundles.

*RC models* are provided with round and rectangular fiber bundles.

*RC models* have one transmit bundle and two detector bundles side-by-side.



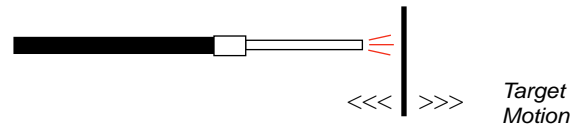
### PRICING

*All prices in this catalog are based on the use of glass fibers.*

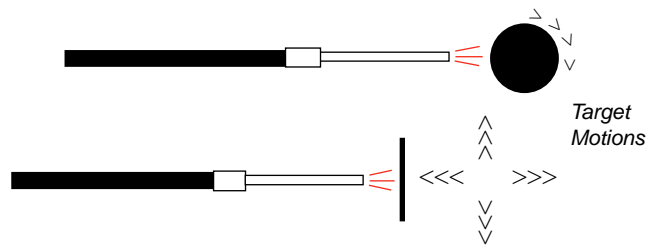
*\*For any quartz fiber application, please submit a request for quotation.*

## SENSOR TYPES

**D** models (Reflectance Dependent) are used for single axis vibration and stroking motions, where the target reflectivity is constant.



**RC** models (Reflectance Compensated) are used for translating and rotating targets, where the target reflectivity is variable.



## SENSOR OUTPUTS

**Analog Sensors**... standard analog output is 0 - 5 Volts, with 20 KHz bandwidth  
... excel in dynamic applications, and bandwidths can exceed 1 megahertz  
... A factory supplied calibration chart provides:  
• The Gap vs. Voltage output  
• The Sensitivity at the middle of the sensor's linear range of operation

**DMS Sensors**... have keypad and LCD for local display at the sensor, and RS232 communication for remote control. Dual-channel units can display single or dual channel readings. They provide linearized distance data via RS232 with 5,000 samples/second maximum single channel rate.

**mini-DMS Sensors**... provide linearized distance data via RS232 or USB with 5,000 samples/second maximum single channel rate.  
... Philtec DMS Control Software enables sensor operation & data collection

**micro-DMS Sensors**... USB powered, provide linearized distance data via USB with 20 KHz max. sampling rate

**Wireless Sensors**... provide distance via USB Bluetooth Micro Adaptor  
... 900 samples/second maximum sampling rate  
... 10 Hour Run Time w/full charge  
... 1 Month Standby Mode  
... Philtec DMS Control Software enables sensor operation & data collection

# SENSOR SYSTEM CONFIGURATIONS

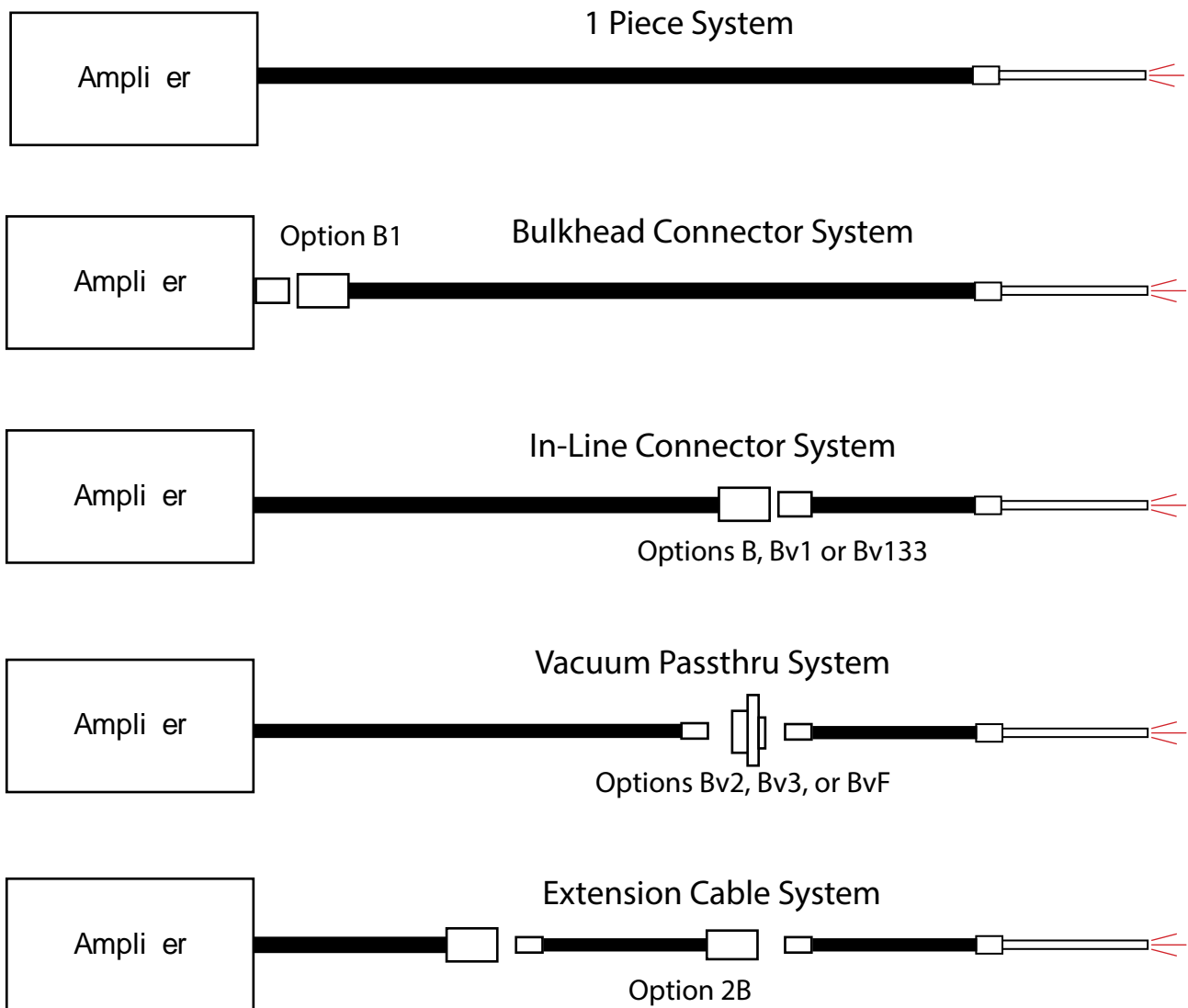
Four types of sensor system configurations can be produced:

1. **One Part System** - the fiberoptic cable is not detachable from the amplifier.
2. **Two Part System** - has a cable-mounted or amplifier bulkhead-mounted connector.
3. **Three Part Vacuum Passthru System** - has a separate vacuum passthru flange.
4. **Three Part Extension Cable System**- has two in-line cable connectors.

Model Number Format:

D6-AB1C1ET1 The basic model number is followed by the letters in alphabetical order designating sensor options.

1. D100
2. D100-B (in-line) or D100-B1 (bulkhead)
3. D100-Bv2
4. D100-2B



# ANALOG SENSORS

## with VOLTAGE OUTPUT

Standard single channel units include amplifier and sensor tip with 1 m long fiberoptic cable, require +12 VDC input power, and provide 0 to +5 volt analog output with DC - 20 KHz bandwidth.

*\* For Quartz Fiber sensors, please send RFQ to our sales department.*

D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
D6	1962
D12	1756
D20	1443
D21	1470
D47	1363
D6	1303
D64	1396
D100	1470
D125	1516
D169	1642
D170	1715
D171	1788
D240	2194



RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
RC19	2360
RC20	2334
RC22	2334
RC25	2227
RC32	2200
RC60	2234
RC62	2294
RC63	2320
RC90	2374
RC100	2374
RC171	2454
RC190	2527
RC290	2820

## OPTIONS FOR ANALOG SENSORS

FOR D MODELS	FOR RC MODELS	OPTION CODE	FEATURE	UNIT PRICE €
✓	✓	A	PROVIDES TEMPERATURE STABILIZED ELECTRONICS FOR LOW DRIFT & HIGH ACCURACY	333
✓	✓	B	CONNECTORIZES SENSOR SYSTEM WITH 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>	732
✓	✓	2B	CONNECTORIZES SENSOR SYSTEM WITH TWO IN-LINE CONNECTORS. NOT AVAILABLE FOR ALL MODELS.	1463
✓	✓	B1	CONNECTORIZES SENSOR SYSTEM WITH BULKHEAD CONNECTOR (D6, RC12 n/a)	732
✓	✓	Bv1	CONNECTORIZES SENSOR SYSTEM WITH SINGLE CHANNEL VACUUM PASSTHRU FOR 10 E-7 TORR. INCLUDES ULTRA-TORR COMPRESSION FITTING (D6, RC12 n/a)	1895
✓	✓	Bv133	SAME AS Bv1 WITH 1.33" DIAMETER MINI-CF TYPE FLANGE FOR BULKHEAD MOUNTING	2187
✓	N/A	Bv2	2 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS FOR 10 E-11 TORR (D6 n/a) <b>*ALSO REQUIRES OPTION B</b>	2500
N/A	✓	Bv3	3 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR RC MODELS FOR 10 E-11 TORR (RC12 n/a), <b>*ALSO REQUIRES OPTION B</b>	3844
✓	✓	BvF	MULTI-CHANNEL HIGH VACUUM PASSTHRU ASSEMBLY FOR 10 E-7 TORR. PROVIDES FUSED FIBEROPTIC PASSTHRU AND MULTI-CHANNEL VACUUM FLANGE ASSEMBLY. CAN ACCOMMODATE 8 D TYPE OR 5 RC TYPE SENSORS. (D6, RC12 & RC20 n/a) <b>*ALSO REQUIRES OPTION B</b>	6477
✓	✓	--	STANDARD JACKET: PVC Monocoil -PVC OVER A STEEL HELICAL WINDING. SEMI-CRUSH-PROOF, LIQUID-TIGHT, NOT AUTOCLAVABLE OR MRI COMPATIBLE. GOOD TO 105C.	--
✓	✓	C1	JACKET: STAINLESS STEEL INTERLOCK, CRUSH PROOF, NOT LIQUID TIGHT. GOOD TO 850C.	166
✓	✓	C2	JACKET: SILICONE - MRI AND BIO-COMPATIBLE, AUTOCLAVABLE, FLEXIBLE, LIQUID-TIGHT, NOT CRUSH-PROOF. GOOD TO 200C	166
✓	✓	C3	JACKET: SILICONE OVER PTFE WRAP - SEMI-CRUSH-PROOF. GOOD TO 200C. SHORT LENGTHS ONLY	219
✓	✓	C4	JACKET: CORRUGATED - ALL PLASTIC. SEMI-CRUSH-PROOF, LIQUID-TIGHT, LIGHT-WEIGHT, MRI COMPATIBLE. GOOD TO 85C.	166
✓	✓	C5	JACKET: PTFE OVER STAINLESS STEEL INTERLOCK - VAPOR BARRIER, LIQUID-TIGHT, CRUSH-PROOF. GOOD TO 260C.	366
✓	✓	C51	JACKET: SS INTERLOCK OVER PTFE - VAPOR BARRIER, LIQUID-TIGHT, CRUSH-PROOF, POOR FLEXIBILITY, GOOD TO 260C.	366



## OPTIONS FOR ANALOG SENSORS

FOR D MODELS	FOR RC MODELS	OPTION CODE	FEATURE	UNIT PRICE €
✓	✓	C6	JACKET: PVC OVER NYLON WRAP - SEMI-CRUSH-PROOF, LIQUID-TIGHT, EMF COMPATIBLE. GOOD TO 105C.	199
✓	✓	C7	JACKET: PTFE TUBING - AUTOCLAVABLE, MRI & EMF COMPATIBLE, VAPOR BARRIER, LIQUID-TIGHT. GOOD TO 260C.	246
✓	✓	C8	JACKET: PVC - POLYVINYL CHLORIDE – VERY FLEXIBLE, LIQUID-TIGHT, EMF & MRI COMPATIBLE, NOT AUTOCLAVABLE, NOT CRUSH-PROOF. GOOD TO 105C.	126
✓	✓	C9	JACKET: ANNEALED (semi-rigid) STAINLESS STEEL TUBING. LIQUID TIGHT. GOOD TO 850C.	RFQ
✓	✓	C10	JACKET: SILICONE OVER SS INTERLOK SHEATHING. LIQUID-TIGHT, CRUSH-PROOF. GOOD TO 200C.	186
✓	✓	C11	JACKET: POLYOLEFIN SHRINK TUBING - THIN WALL MOISTURE/VAPOR BARRIER, NOT CRUSH-PROOF, POOR FLEXIBILITY. GOOD TO 150C.	366
✓	✓	C12	JACKET: POLYOLEFIN OVER SS INTERLOK - THIN WALL MOISTURE/VAPOR BARRIER, CRUSH-PROOF, FLEXIBLE. GOOD TO 150C.	552
✓	✓	E1	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet or to 49 Feet); ANY FIBER BUNDLE < Ø 2.5 mm	96/m
✓	✓	E2	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet or to 49 Feet); ANY FIBER BUNDLE > Ø 2.5 mm	144/m
✓	✓	Fv1	LOW VACUUM PASSTHRU FOR 10 E-4 TORR. PROVIDES SOLID SECTION ON FIBEROPTIC CABLE, COMPRESSION FITTING, AND STAINLESS STEEL INTERLOK SHEATHING ON VACUUM SIDE	672
✓	✓	Fv2	LOW VACUUM PASSTHRU, SAME AS Fv1, PROVIDES Ø 0.250" X 3"L SOLID SECTION ON FO CABLE	658
✓	✓	Fv3	LOW VACUUM PASSTHRU, SAME AS Fv1, PROVIDES Ø 0.500" X 3"L SOLID SECTION ON FO CABLE	732
✓	✓	G1	ADDITIONAL OUTPUT, DC COUPLED WITH 10x GAIN and ADJUSTABLE DC OFFSET	322
✓	✓	G2	ADDITIONAL OUTPUT, AC COUPLED WITH 10x GAIN	326
✓	N/A	H1	HIGH FREQUENCY AMPLIFIER FOR D MODELS UP TO 200 KHZ BANDWIDTH	246
✓	N/A	H2	HIGH FREQUENCY AMPLIFIER FOR D MODELS ABOVE 200 KHZ TO 1 MHZ BANDWIDTH	366
N/A	✓	H3	HIGH FREQUENCY AMPLIFIER FOR RC MODELS UP TO 350 KHZ BANDWIDTH	439
✓	N/A	+H1	ADDITIONAL OUTPUT FOR D MODELS WITH BANDWIDTHS UP TO 200 KHZ	406
✓	N/A	+H2	ADDITIONAL OUTPUT FOR D MODELS WITH BANDWIDTHS UP TO 1 MHZ	585
N/A	✓	+H3	ADDITIONAL OUTPUT FOR RC MODELS WITH BANDWIDTHS UP TO 350 KHZ	599
✓	✓	L	LOW FREQUENCY AMPLIFIER ( < 20 KHz), 100 Hz STD	126
✓	✓	+L	ADDITIONAL OUTPUT WITH LOW FREQUENCY BANDWIDTH ( < 20 KHz), 100 Hz STD	279
✓	✓	M	DIGITAL DISPLAY - DC VOLTS	293
N/A	✓	N	LOW NOISE AMPLIFIER (RC sensors only)	166
✓	✓	O	ADJUSTABLE DC OFFSET	166
✓	✓	P	POLYNOMIAL CURVE FIT TO SPECIFIED CALCULATION RANGE	133
✓	✓	Q	CONNECTORIZED AC/DC POWER ADAPTOR AND BNC OUTPUT	160
✓	✓	R1	AMBIENT LIGHT REJECTION	186
✓	✓	R2	BLUE LIGHT SENSOR, 470 nm	439
✓	✓	T1	TIP: STRAIGHT, CUSTOMIZED	193
✓	✓	T2	TIP: THREADED	306
✓	✓	T3	TIP: NON-METALLIC , (TORLON OR PEEK)	266
✓	✓	T4	TIP: 90° TUBING	306
✓	✓	T5	TIP: 90° SQUARE BODY, UNTHREADED END	452
✓	✓	T6	TIP: 90° SQUARE BODY, THREADED END	492
✓	✓	T7	TIP: MADE TO CUSTOMER SPECIFICATIONS	RFQ
✓	✓	T8	TIP: HIGH TEMPERATURE, 350°C MAX.	246
✓	✓	T9	TIP: HIGH TEMPERATURE, 480°C MAX.	479
✓	✓	T10	TIP: HIGH TEMPERATURE, >480°C (QUARTZ FIBERS)	RFQ
✓	✓	T11	TIP: NON-MAGNETIC (BRASS OR ALUMINUM)	246
✓	✓	T12	TIP: INVAR (LOW EXPANSION COEFFICIENT)	RFQ
✓	✓	V	PROVIDES SENSOR AMPLIFIER WITH 0 - 10 VOLT OUTPUT	326
✓	✓	W	WINDOW: RECESSED SAPPHIRE EPOXIED INTO TIP FOR HIGH PRESSURE OR VACUUM	366
✓	✓	Wb	WINDOW: SAPPHIRE BRAZED TO SENSOR TIP FOR HIGH PRESSURE OR VACUUM	RFQ

# DIGITAL SENSORS

## DISTANCE OUTPUT via RS232

Displacement Measurement Systems provide a linearized distance output via digital communication. Standard DMS units can be operated via keypad or remotely via RS232. Dual-channel units can display single or dual channel readings. Price includes RS232 cable, Philtec DMS Control Software, sensor tip with 3 foot long fiberoptic cable and AC/DC power adaptor. All units have full-featured capability for:

- Amplifier Temperature Stabilization
- Calibration Scaling & Storage
- Data Averaging
- 5,000 Samples/Sec Max. per RS232 port
- Peak-to-Peak Amplitudes
- Tared Readings
- Total Runout, T.I.R.



D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
DMS-D6	2840
DMS-D12	2633
DMS-D20	2320
DMS-D21	2347
DMS-D47	2241
DMS-D63	2181
DMS-D64	2274
DMS-D100	2347
DMS-D125	2394
DMS-D169	2514
DMS-D170	2594
DMS-D171	2666
DMS-D240	3072

### SINGLE CHANNEL UNITS



178 x 102 x 57 mm Enclosure

RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
DMS-RC19	3285
DMS-RC20	3212
DMS-RC22	3212
DMS-RC25	3106
DMS-RC32	3079
DMS-RC60	3112
DMS-RC62	3172
DMS-RC63	3198
DMS-RC90	3245
DMS-RC100	3252
DMS-RC171	3332
DMS-RC190	3404
DMS-RC290	3697

D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
2DMS-D6	4552
2DMS-D12	4216
2DMS-D20	3710
2DMS-D21	3757
2DMS-D47	3584
2DMS-D63	3491
2DMS-D64	3644
2DMS-D100	3757
2DMS-D125	3830
2DMS-D169	4030
2DMS-D170	4143
2DMS-D171	4263
2DMS-D240	4914

### DUAL CHANNEL UNITS



178 x 102 x 57 mm Enclosure

RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
2DMS-RC19	5254
2DMS-RC20	5140
2DMS-RC22	5140
2DMS-RC25	4961
2DMS-RC32	4927
2DMS-RC60	4974
2DMS-RC62	5067
2DMS-RC63	5114
2DMS-RC90	5187
2DMS-RC100	5200
2DMS-RC171	5327
2DMS-RC190	5446
2DMS-RC290	5912

# OPTIONS FOR DIGITAL SENSORS

FOR D MODELS	FOR RC MODELS	OPTION CODE	FEATURE	UNIT PRICE €
✓	✓	A	PROVIDES ANALOG OUTPUTS FOR muDMS SENSORS	333
✓	✓	B	CONNECTORIZES SENSOR SYSTEM WITH IN-LINE CONNECTOR. (D6, n/a) <b>*OPTION B IS ALSO REQUIRED FOR USE WITH VACUUM PASSTHRU FLANGES &amp; ASSEMBLIES Bv2, Bv3, Bv4, BvF</b>	732
✓	✓	2B	CONNECTORIZES SENSOR SYSTEM WITH TWO IN-LINE CONNECTORS. NOT AVAILABLE FOR ALL MODELS.	1463
✓	✓	B1	CONNECTORIZES SENSOR SYSTEM WITH BULKHEAD CONNECTOR (D6 n/a)	732
✓	✓	Bv1	CONNECTORIZES SENSOR SYSTEM WITH SINGLE CHANNEL VACUUM PASSTHRU HARDWARE FOR 10 E-7 TORR. INCLUDES ULTRA-TORR COMPRESSION FITTING (D6 n/a)	1895
✓	✓	Bv133	SAME AS Bv1 WITH 1.33" DIAMETER MINI-CF TYPE FLANGE FOR BULKHEAD MOUNTING	2188
✓	N/A	Bv2	2 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS FOR 10 E-11 TORR (D6 n/a) <b>*also Requires Option B</b>	2500
N/A	✓	Bv3	3 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR RC MODELS FOR 10 E-11 TORR, <b>*also Requires Option B</b>	3844
✓	✓	BvF	MULTI-CHANNEL VACUUM PASSTHRU ASSEMBLY FOR 10 E-7 TORR. CAN ACCOMMODATE UP TO 8 D TYPE OR 5 RC TYPE SENSORS. (D6, RC12 & RC20 n/a) <b>*also requires Option B</b>	6477
✓	✓	--	STANDARD JACKET: PVC MONOCOIL -PVC OVER A STEEL HELICAL WINDING. SEMI-CRUSH-PROOF, LIQUID-TIGHT, NOT AUTOCLAVABLE OR MRI COMPATIBLE. GOOD TO 105C.	--
✓	✓	C1	JACKET: STAINLESS STEEL INTERLOCK, CRUSH PROOF, NOT LIQUID TIGHT. GOOD TO 850C.	160
✓	✓	C2	JACKET: SILICONE - MRI AND BIO-COMPATIBLE, FLEXIBLE, LIQUID-TIGHT, NOT CRUSH-PROOF. GOOD TO 200C	160
✓	✓	C3	JACKET: SILICONE OVER PTFE WRAP - SEMI-CRUSH-PROOF. GOOD TO 200C. SHORT LENGTHS ONLY	219
✓	✓	C4	JACKET: CORRUGATED - ALL PLASTIC. SEMI-CRUSH-PROOF, LIQUID-TIGHT, LIGHT-WEIGHT, MRI COMPATIBLE. GOOD TO 85C.	160
✓	✓	C5	JACKET: PTFE OVER STAINLESS STEEL INTERLOCK - VAPOR BARRIER, LIQUID-TIGHT, CRUSH-PROOF. GOOD TO 260C.	366
✓	✓	C51	JACKET: SS INTERLOCK OVER PTFE - VAPOR BARRIER, LIQUID-TIGHT, CRUSH-PROOF, POOR FLEXIBILITY, GOOD TO 260C.	366
✓	✓	C6	JACKET: PVC OVER NYLON WRAP - SEMI-CRUSH-PROOF, LIQUID-TIGHT, EMF COMPATIBLE. GOOD TO 105C.	199
✓	✓	C7	JACKET: PTFE TUBING - AUTOCLAVABLE, MRI & EMF COMPATIBLE, VAPOR BARRIER, LIQUID-TIGHT. GOOD TO 260C.	239
✓	✓	C8	JACKET: PVC - POLYVINYL CHLORIDE – VERY FLEXIBLE, LIQUID-TIGHT, EMF & MRI COMPATIBLE, NOT AUTOCLAVABLE, NOT CRUSH-PROOF. GOOD TO 105C.	126
✓	✓	C9	JACKET: ANNEALED (semi-rigid) STAINLESS STEEL TUBING. LIQUID TIGHT. GOOD TO 850C.	RFQ
✓	✓	C10	JACKET: SILICONE OVER SS INTERLOCK SHEATHING. LIQUID-TIGHT, CRUSH-PROOF. GOOD TO 200C.	186
✓	✓	C11	JACKET: POLYOLEFIN SHRINK TUBING - THIN WALL MOISTURE/VAPOR BARRIER, NOT CRUSH-PROOF, POOR FLEXIBILITY. GOOD TO 150C.	366
✓	✓	E1	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet, others to 49 Feet); ANY FIBER BUNDLE < Ø 2.5 mm	96/m
✓	✓	E2	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet, others to 49 Feet); ANY FIBER BUNDLE < Ø 2.5 mm	144/m
✓	✓	Fv1	LOW VACUUM PASSTHRU FOR 10 E-4 TORR. PROVIDES Ø 0.375" X 3"L SOLID SECTION ON FO CABLE	672
✓	✓	Fv2	LOW VACUUM PASSTHRU FOR 10 E-4 TORR. PROVIDES Ø 0.250" X 3"L SOLID SECTION ON FO CABLE	658
✓	✓	Fv3	LOW VACUUM PASSTHRU FOR 10 E-4 TORR. PROVIDES Ø 0.500" X 3"L SOLID SECTION ON FO CABLE	732
✓	✓	R1	AMBIENT LIGHT REJECTION	186
✓	✓	R2	BLUE LIGHT SENSOR, 470 NM	439
✓	✓	T1	TIP: STRAIGHT, CUSTOMIZED	193
✓	✓	T2	TIP: THREADED	306
✓	✓	T3	TIP: NON-METALLIC , (TORLON OR PEEK)	266
✓	✓	T4	TIP: 90° TUBING	306
✓	✓	T5	TIP: 90° SQUARE BODY, UNTHREADED END	452
✓	✓	T6	TIP: 90° SQUARE BODY, THREADED END	492
✓	✓	T7	TIP: MADE TO CUSTOMER SPECIFICATIONS	RFQ
✓	✓	T8	TIP: HIGH TEMPERATURE, 350°C MAX.	239
✓	✓	T9	TIP: HIGH TEMPERATURE, 480°C MAX.	479
✓	✓	T10	TIP: HIGH TEMPERATURE, >480°C (QUARTZ FIBERS)	RFQ
✓	✓	T11	TIP: NON-MAGNETIC (BRASS OR ALUMINUM)	239
✓	✓	T12	TIP: INVAR (LOW EXPANSION COEFFICIENT)	RFQ
✓	✓	W	WINDOW: RECESSED SAPPHIRE EPOXIED INTO TIP FOR HIGH PRESSURE OR VACUUM	366
✓	✓	Wb	WINDOW: SAPPHIRE BRAZED TO SENSOR TIP FOR HIGH PRESSURE OR VACUUM	RFQ

# mini-DIGITAL SENSORS

## DISTANCE OUTPUT via RS232

These units are streamlined for PC operation only. They use RS232 protocol 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 REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
mDMS-D6	2254
mDMS-D12	2048
mDMS-D20	1736
mDMS-D21	1762
mDMS-D47	1656
mDMS-D63	1596
mDMS-D64	1689
mDMS-D100	1762
mDMS-D125	1809
mDMS-D169	1935
mDMS-D170	2008
mDMS-D171	2081
mDMS-D240	2487



Packaged in a 112 x 61 x 33 mm enclosure. Includes universal AC/DC Power Adaptor and Y Cable Adaptor for power input and signal output.

RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
mDMS-RC19	2700
mDMS-RC20	2627
mDMS-RC22	2627
mDMS-RC25	2520
mDMS-RC32	2494
mDMS-RC60	2527
mDMS-RC62	2587
mDMS-RC63	2613
mDMS-RC90	2660
mDMS-RC100	2666
mDMS-RC171	2746
mDMS-RC190	2820
mDMS-RC290	3112

## DISTANCE OUTPUT via USB

These units are designed for PC operation only. They use USB communication with 5,000 samples/sec maximum data rate. The standard length fiberoptic cable is 914 mm (3 Feet). All units include Philtec DMS Control Software for Sensor Setup and Data Collection.

D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
muDMS-D6	2547
muDMS-D12	2341
muDMS-D20	2028
muDMS-D21	2055
muDMS-D47	1948
muDMS-D63	1888
muDMS-D64	1982
muDMS-D100	2055
muDMS-D125	2101
muDMS-D169	2228
muDMS-D170	2301
muDMS-D171	2374
muDMS-D240	2780



Packaged in a 140 x 82 x 48 mm enclosure. Includes mini-USB to standard USB adapter cable and AC/DC power adaptor.

RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
muDMS-RC19	2993
muDMS-RC20	2919
muDMS-RC22	2919
muDMS-RC25	2813
muDMS-RC32	2786
muDMS-RC60	2820
muDMS-RC62	2879
muDMS-RC63	2906
muDMS-RC90	2953
muDMS-RC100	2959
muDMS-RC171	3039
muDMS-RC190	3112
muDMS-RC290	3405



# USB POWERED SENSORS

## DISTANCE OUTPUT via USB

Introducing our smallest and most powerful digital sensor with USB output: the microDMS series ( $\mu$ DMS). Powered via any standard USB port and multiplexed via any standard USB hub, this new sensor has a maximum data sample rate of 16,000 samples per second. With its very small size enclosure it is only available with Philtec's smaller fiber optic probes.

D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
$\mu$ DMS-D6	2547
$\mu$ DMS-D12	2341
$\mu$ DMS-D20	2028
$\mu$ DMS-D21	2055
$\mu$ DMS-D47	1948
$\mu$ DMS-D63	1889
$\mu$ DMS-D64	1982
$\mu$ DMS-D100	2055



Packaged in a 145 gram enclosure of LWH dimensions 75 x 50 x 23 mm.

RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
$\mu$ DMS-RC19	2993
$\mu$ DMS-RC20	2919
$\mu$ DMS-RC22	2919
$\mu$ DMS-RC25	2813
$\mu$ DMS-RC32	2786
$\mu$ DMS-RC60	2820
$\mu$ DMS-RC100	2959

# BLUETOOTH SENSORS

## DISTANCE OUTPUT via WIRED RS232 or WIRELESS BLUETOOTH MODES

An accessory pack enabling any Philtec mDMS sensor with RS232 output to be operated in **wired or wireless modes**.

**BAP 2.0** includes:

- Bluetooth Battery/Radio Module
- USB Bluetooth Micro Adaptor
- 6 Ft. Mini to Standard USB Cable
- 1 Ft. Sensor Data Link Cable
- Operating Software

**Specifications**

Time To Charge: 4 Hours  
 Run Time: 10 Hours w/full charge  
 Standby Mode: 4 Weeks  
 Run Time: 3 Hours After 4 weeks Standby  
 Bluetooth Pairing Code: 1234  
 Max. Data Rate = 900 Samples/Second  
 Philtec DMS Control Software enables sensor operation & data collection  
 Packaged in two 4.4 x 2.4 x 1.2 mm enclosures.

**OPERATION**

The Bluetooth Module connects to a PC for battery charging. A data link cable connects the mDMS sensor to the Bluetooth module for wireless operation using Philtec's DMS Control software.



- BAP 2.0
- Bluetooth Module
- mDMS Sensor
- BAP 2.0 ..... € 1895

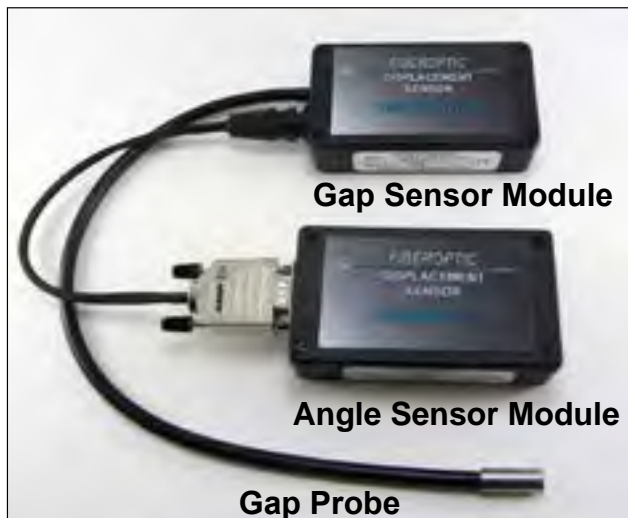
# ROUNDNESS MEASUREMENT SYSTEMS

GAP & ANGLE OUTPUT via BLUETOOTH

## DESCRIPTION

The CMS-3000 series are wireless instrumentation systems for the non-contact measurement of roundness and clearances in large gas turbines. The systems are comprised of:

- 15 mm Range Fiberoptic Gap Measuring Probe
- Gap Sensor Electronics Module
- Angle Sensor Electronics Module
- 8" Windows Tablet Preloaded with Philtec's CMS Control Software
- Military Grade Protective Case for Tablet
- Flash Drive To Offload Data for Analysis



**Tablet for Display and Data Collection**

## OPERATION

The Gap Probe, Gap Sensor Module and Angle Sensor Module are temporarily mounted with one element on each of three adjacent turbine blades. The rotor is slowly turned 360° as the tablet records the blade tip to casing clearance variations. Eccentricities and ovalizations are measured with these systems that digitally capture the full 360° map of casing roundness and gap data. Using the Quad System, data can be collected from four rows of blades simultaneously.

MODEL	# channels	UNIT PRICE
CMS 3100	Single	€6384
CMS 3200	Dual	€11970
CMS-3400	Quad	€23142

# MULTI-CHANNEL RACKS FOR DIGITAL SENSORS

## DISTANCE OUTPUT via RS232

The model **10DMS** is a 19 inch rack mount enclosure for powering and controlling up to 10 digital sensor channels. Mini-DMS sensors are provided as plug-in modules for easy installation & removal. **10DMS** operates on AC power and is controlled via RS232 communication. Price includes RS232 cable, and Philtec DMS Control Software.



The rack can be connected with additional racks thereby allowing communication to a larger matrix of sensors. Any combination of D and RC models can be mixed in the rack.



DMS Control Software includes a multi-configuration screen where 10 sensors can be setup and controlled simultaneously.



**10DMS 19" Rack**



### Plug-in Sensor Modules are ordered separately:

Specify "mcDMS - model # - options" and the quantity desired. For example, mcDMS-RC100-BT1, qty 8.

Prices for the modules are the same as the mDMS however they use the prefix mcDMS.

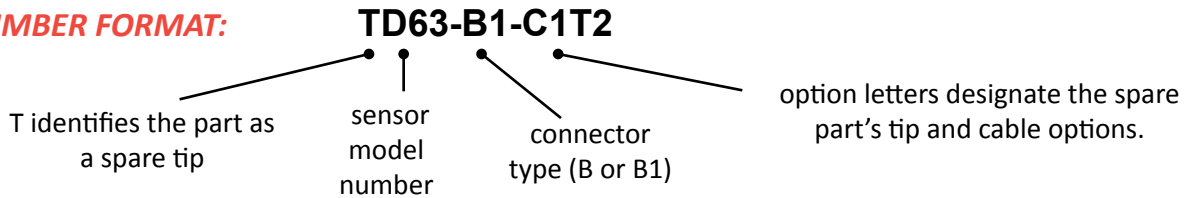


**Plug-in Modules for the Rack**

MODEL	UNIT PRICE
10DMS	€3983

# REPLACEABLE SENSOR TIPS

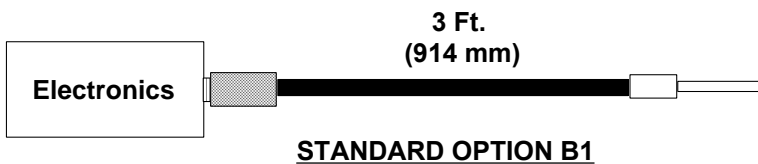
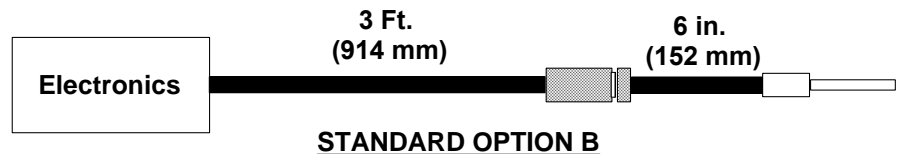
## MODEL NUMBER FORMAT:



## CONNECTORIZED FIBEROPTICS

Sensors are available with in-line (Option B) or bulkhead mounted (Option B1) connectors. Options B and B1 offer several advantages such as:

- Easy replacement of damaged tips
- Substitution of alternate tips
- Removal of electronics from machinery without removing sensor tips



## SPARE TIP NOTES

**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.

**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 interface. Connectorized sensors have increased noise levels (2 - 3 times higher). Use of connectorized fiberoptics with very dark targets is not recommended.

D MODELS REFLECTANCE DEPENDENT	
MODEL	B or B1 €
TD6	not available
TD12 - TD47	732
TD63 - TD100	771
TD125 - TD170	845
TD171	951
TD240	1097

RC MODELS REFLECTANCE COMPENSATED	
MODEL	B or B1 €
TRC19, TRC20, TRC22, TRC32, TRC60	871
TRC25, TRC62, TRC63	1064
TRC100, TRC171	918
TRC90, TRC190	1097
TRC290	1244



# 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	LIST PRICE €
<b>Bv1</b>	Single / Dual	D or RC	10 <sup>-7</sup>		1895
<b>Bv133</b>	Single / Dual	D or RC	10 <sup>-7</sup>		2188
<b>Bv2</b>	Single	D	10 <sup>-11</sup>		2500
<b>Bv3</b>	Single	RC	10 <sup>-11</sup>		3844
<b>BvF - CF</b>	Multi	D and RC	10 <sup>-7</sup>		6477
<b>BvF - ISO</b>	Multi	D and RC	10 <sup>-7</sup>		6477
<b>Fv1</b>	Single	D or RC	10 <sup>-4</sup>		672
<b>Fv2</b>	Single	D or RC	10 <sup>-4</sup>		658
<b>Fv3</b>	Single	D or RC	10 <sup>-4</sup>		732
<b>W</b>	Single	D or RC	10 <sup>-7</sup>		366
<b>Wb</b>	Single	D or RC	10 <sup>-11</sup>		RFQ

# 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.

- **Cal-A SENSOR CALIBRATIONS IN AIR** .....€352 each
- **Cal-F SENSOR CALIBRATIONS IN FLUID** ..... €532 each
- **FOR NIST TRACEABLE CALIBRATION ... ADD €133 each**

## CALIBRATION CHECK MIRROR

A calibration check mirror is provided along with a Certificate of Calibration which specifies the accuracy of a single point sensor reading.

- **Model CM32940** ..... €266 each

## COMPRESSION FITTINGS

Stainless Steel fittings with nylon compression ferrules can be used to hold sensor tips and vacuum passthru fittings. Overall length is approx. 1.4". They can be bulkhead mounted into a 0.5" deep straight threaded hole.



- **Model CF125** for D63, D64, D100, RC100. Requires 5/16-24 threaded hole ..... €73 each
- **Model CF187** for D169 - D171, RC171. Requires 3/8-24 threaded hole ..... €86 each
- **Model CF250** for Fv2. Requires 7/16-20 threaded hole ..... €93 each
- **Model CF312** for RC90, RC190. Requires 1/2-20 threaded hole ..... €100each
- **Model CF375** for Fv1, Requires 9/16-18 threaded hole ..... €109each
- **Model CF500** for Fv3, Requires 3/4-16 threaded hole ..... €120each

## 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.



- **Model M25**, 1/4" Diameter Disc ..... €47 each
- **Model M50**, 1/2" Diameter Disc ..... €80 each

## RETRO-REFLECTIVE TAPE

- **Model RT1**, 100 mm Square ..... €47 each



## 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 active adjustment of the sensor-to-target gap.



- **Model B25**, 0.6" Lx0.4" Wx0.42" D, for any model with  $\varnothing$  1/4" collar probes ..... €86 each
- **Model B31**, 0.75" Lx0.5" Wx0.5" D, for any model with  $\varnothing$  5/16" collar probes ..... €120 each

## MICRO-STAGES

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



- **Model 55416** Single Axis Stage, 0.18" Travel for use with B25 Block ..... €326 each
- **Model 56422** Single Axis Stage, 0.5" Travel for use with B31 Block ..... €366 each

# 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-1 ..... € 186 each

**Model PS-10** enables single channel operation of any rack mountable mcDMS sensor (without using the 10DMS rack). Includes 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.

- Model PS-10 ..... € 199 each

- **Model PS-U** ... universal power supply for mini-DMS sensors (power supply only)..... € 93 each



## 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

- Model PS-Q .....€ 120 each



## 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

- Model ADB9 Serial Adaptor ..... € 73 each



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

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



- Model AUSB USB Adaptor ..... € 73 each