

# 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:

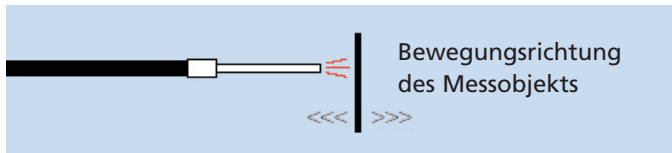
- Reflektions-gestützte D-Sensoren für Applikationen, bei denen sich das Messobjekt entlang der Sensorachse bewegt.
- Reflektionskompensierte RC-Sensoren für Anwendungen, bei denen das Messobjekt rotiert oder aus dem Sensorbereich herausbewegt wird.
- Vakuum Sensoren, die sich hervorragend für Wafer 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.

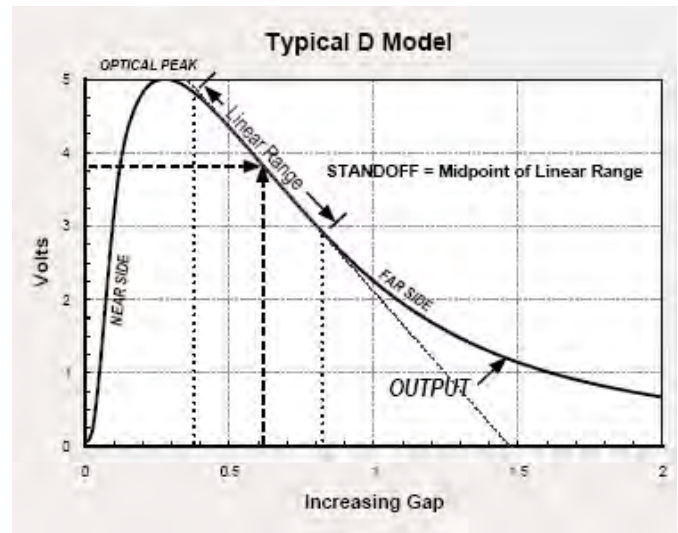
ROGA-Instruments, Steinkopfweg 7, D-55425 Waldalgesheim  
Phone: +49 (0) 6721-98 44 54, Fax: +49 (0) 6721-98 44 74

### 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

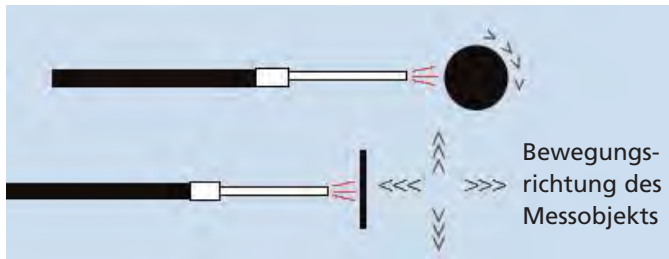
Merkmal	Einheit	D6	D12	D20	D21	D63	D64	D100	D125	D169	D170	D171
Spitzendurchmesser	mm	0,81	0,81	0,81	0,81	3,18	3,18	3,18	3,96	4,76	4,76	4,76
Arbeitsbereich	mm	1	2	1,3	2	3	6	10	15	20	30	50
	mils	40	80	50	80	125	250	400	800	800	1200	2000
Optischer Spitzenwert	mm	0,23	0,23	0,13	0,28	0,15	0,3	0,43	0,48	0,56	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

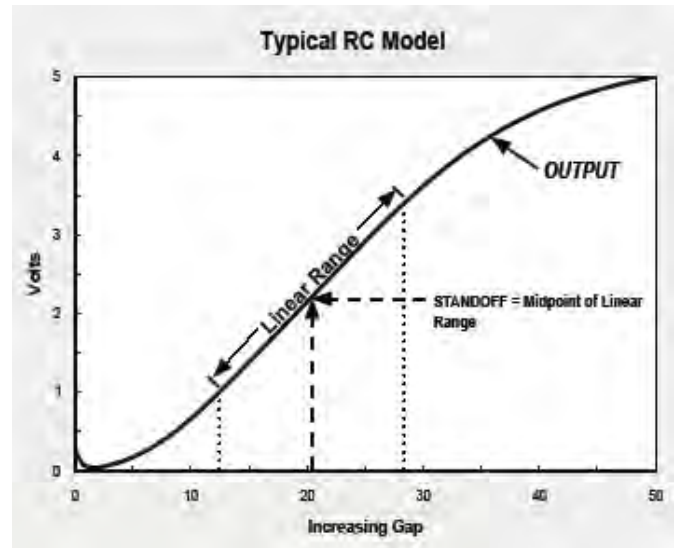
- Bewegungserfassung von Stellgliedern
- Vibrationen bei Lagern
- Auslenkung von Membranen
- Abstandsmessung in Flüssigkeiten
- Dyn. Untersuchungen an Kraftstoffeinspritzdüsen
- Eindring- und Schlagstudien
- Positionieren von Teilen
- Schwingungsuntersuchungen an Piezokristallen
- Kolbenpositionserfassung (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	D171
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



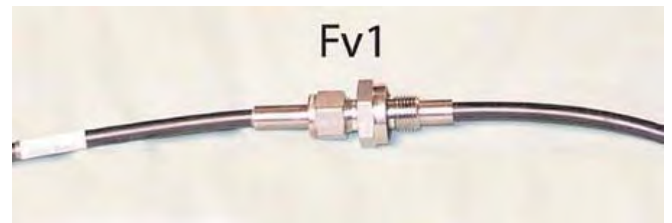
Einkanalige Ultrahochvakuum Durchföhrung für bis zu  $10e^{-11}$  Torr

### FENSTERAUFNEHMER



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

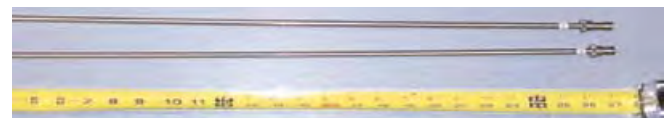
### DURCHFÜHRUNG IM NIEDRIGVAKUUM



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



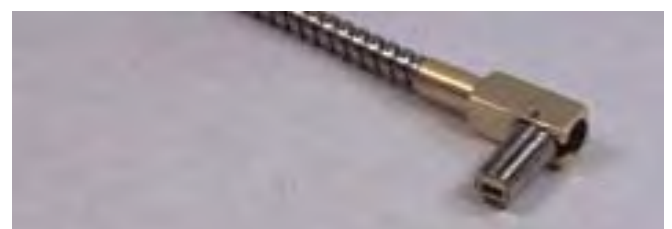
z.B.: gerade Spitzen mit Gewinde



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.





**Export  
Product-Price List  
February 2009**

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

**Fiberoptic Sensors**

**for distance  
displacement  
and vibration**



Type D Analog Output



10DMS Rack



DMS RS232 Out



Type RC Analog Out



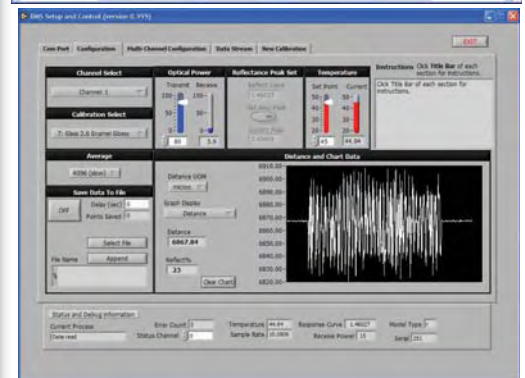
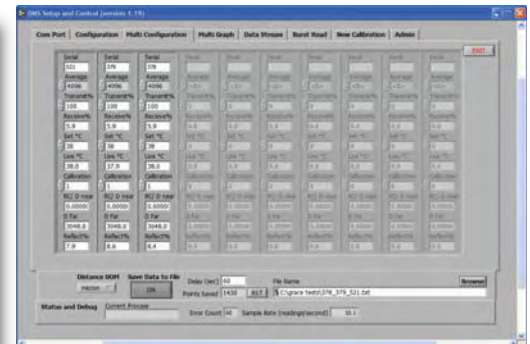
muDMS USB Out



mini-DMS RS232 Out

## 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 Fiber optic Cable Materials To Suit Application
5. Connectorize The System As Desired
6. Select Analog or Digital Output Package



DMS Control Software

**PHILTEC**

www.philtec.com

Precision Dynamic Measurements

# FIBEROPTIC DISPLACEMENT SENSORS

with ANALOG OUTPUT

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

D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
D6	1375
D12	1230
D20	1110
D21	1135
D47	1050
D63	1015
D64	1075
D100	1135
D125	1175
D169	1260
D170	1320
D171	1380



*MODEL NUMBER FORMAT:*

**D6-AB1C1**

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

RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
RC12	1830
RC20	1675
RC25	1710
RC60	1710
RC62	1770
RC63	1795
RC90	1830
RC100	1770
RC140	1890
RC171	1830
RC190	1995

## 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	235
✓	✓	B	CONNECTORIZES SENSOR SYSTEM WITH IN-LINE CONNECTOR. (D6, RC12 n/a). OPTION B IS ALSO REQUIRED FOR USE WITH VACUUM PASSTHRU FLANGES & ASSEMBLIES Bv2, Bv3, Bv4, BvF, BvW	510
✓	✓	B1	CONNECTORIZES SENSOR SYSTEM WITH BULKHEAD CONNECTOR (D6, RC12 n/a)	510
✓	✓	Bv1	CONNECTORIZES SENSOR SYSTEM WITH SINGLE CHANNEL VACUUM PASSTHRU HARDWARE FOR 10 E-7 TORR. INCLUDES ULTRA-TORR COMPRESSION FITTING (D6, RC12 n/a)	1435
✓	X	Bv2	2 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS FOR 10 E-11 TORR (D6 n/a) *see Option B	1890
X	✓	Bv3	3 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR RC MODELS FOR 10 E-11 TORR (RC12 n/a), *see Option B.	2575
✓	X	Bv4	4 PORT DUAL CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS FOR 10 E-11 TORR (D6 n/a) *see Option B	3480
✓	✓	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) *see Option B	4680
✓	✓	BvW	WELDABLE SINGLE PORT UHV PASSTHRU FLANGE. 2 REQUIRED FOR D MODELS; 3 REQUIRED FOR RC MODELS. PRICE DOES NOT INCLUDE ELECTRONICS OR LIGHT GUIDES. (D6, RC12 & RC20 n/a) *see Option B	1380
✓	✓	C1	INTERLOCKING STAINLESS STEEL SHEATHING FOR FIBEROPTIC CABLES	120
✓	✓	C2	SILICONE TUBING SHEATHING FOR FIBEROPTIC CABLES	120



## OPTIONS FOR ANALOG SENSORS

FOR D MODELS	FOR RC MODELS	OPTION CODE	FEATURE	UNIT PRICE €
✓	✓	C3	SILICONE TUBING OVER TEFLON WRAP SHEATHING FOR FIBEROPTIC CABLES	150
✓	✓	C4	SILICONE TUBING OVER STEEL MONOCOIL SHEATHING FOR FIBEROPTIC CABLES	120
✓	✓	C5	TEFLON OVER STAINLESS STEEL INTERLOK SHEATHING FOR FIBEROPTIC CABLES	240
✓	✓	C6	PVC OVER NYLON WRAP SHEATHING FOR FIBEROPTIC CABLES	150
✓	✓	C7	TEFLON TUBING SHEATHING FOR FIBEROPTIC CABLES	180
✓	✓	C8	PVC SHRINKWRAP SHEATHING FOR FIBEROPTIC CABLES	90
✓	✓	C9	ANNEALED (semi-rigid) STAINLESS STEEL TUBING	240
✓	✓	C10	SILICONE OVER SS INTERLOK SHEATHING	120
X	✓	D	REFLECTANCE DEPENDENT OUTPUT ADDED TO RC SENSOR	180
✓	✓	E	EXTRA LENGTH OF FIBEROPTIC CABLE, 49 FT. MAX. (14.9 m)	24/FT
✓	✓	Fv1 Fv2	LOW VACUUM PASSTHRU FOR 10 E-4 TORR.. PROVIDES SOLID SECTION ON FIBEROPTIC CABLE, COMPRESSION FITTING, AND STAINLESS STEEL INTERLOK SHEATHING ON VACUUM SIDE	390
✓	✓	G1	ADDITIONAL OUTPUT, DC COUPLED WITH 10x GAIN and ADJUSTABLE DC OFFSET	240
✓	✓	G2	ADDITIONAL OUTPUT, AC COUPLED WITH 10x GAIN	240
✓	X	H1	HIGH FREQUENCY AMPLIFIER FOR D MODELS UP TO 200 KHZ BANDWIDTH	180
✓	X	H2	HIGH FREQUENCY AMPLIFIER FOR D MODELS ABOVE 200 KHZ TO 1 MHZ BANDWIDTH	240
X	✓	H3	HIGH FREQUENCY AMPLIFIER FOR RC MODELS UP TO 350 KHZ BANDWIDTH	300
✓	X	H4	HIGH SLEW RATE AMPLIFIER FOR HIGH SPEED TACHOMETER APPLICATIONS, 1 MHZ BANDWIDTH	250
✓	X	+H1	ADDITIONAL OUTPUT FOR D MODELS WITH BANDWIDTHS UP TO 200 KHZ	300
✓	X	+H2	ADDITIONAL OUTPUT FOR D MODELS WITH BANDWIDTHS UP TO 1 MHZ	360
X	✓	+H3	ADDITIONAL OUTPUT FOR RC MODELS WITH BANDWIDTHS UP TO 350 KHZ	420
✓	✓	L	LOW FREQUENCY AMPLIFIER (< 20 KHz), 100 Hz STD	90
✓	✓	+L	ADDITIONAL OUTPUT WITH LOW FREQUENCY BANDWIDTH (< 20 KHz), 100 Hz STD	210
✓	✓	M	DIGITAL DISPLAY - DC VOLTS	180
X	✓	N	LOW NOISE AMPLIFIER (RC sensors only)	120
✓	✓	O	ADJUSTABLE DC OFFSET	120
✓	✓	P	POLYNOMIAL CURVE FIT TO SPECIFIED CALCULATION RANGE	90
✓	✓	Q	CONNECTORIZED AC/DC POWER ADAPTOR AND BNC OUTPUT	120
✓	✓	R	AMBIENT LIGHT REJECTION	120
✓	X	S	SIDE-VIEWING SENSOR TIP	420
✓	✓	T1	CUSTOMIZED SENSOR TIP, STRAIGHT	120
✓	✓	T2	CUSTOMIZED SENSOR TIP, STRAIGHT and THREADED	150
✓	✓	T3	CUSTOMIZED SENSOR TIP, NON-METALLIC	150
✓	✓	T4	SIMPLE RIGHT ANGLE TIP	180
✓	✓	T5	SQUARE BODY RIGHT ANGLE TIP, UNTHREADED	240
✓	✓	T6	SQUARE BODY RIGHT ANGLE TIP, THREADED	300
✓	✓	T7	SPECIAL TIP MADE TO CUSTOMER SPECIFICATIONS	RFQ
✓	✓	T8	HIGH TEMPERATURE TIP, 250°C MAX.	180
✓	✓	T9	HIGH TEMPERATURE TIP, 482°C MAX.	360
✓	✓	V	PROVIDES SENSOR AMPLIFIER WITH 0 - 10 VOLT OUTPUT	240
✓	✓	W	WINDOW PROBE FOR HIGH PRESSURE OR VACUUM	265
✓	✓	Z	ADDITIONAL OUTPUT WITH LINEAR RANGE SPANNING 0 - 5 VOLTS	240

# DMS - DISPLACEMENT MEASUREMENT SYSTEMS

with SERIAL COMMUNICATION

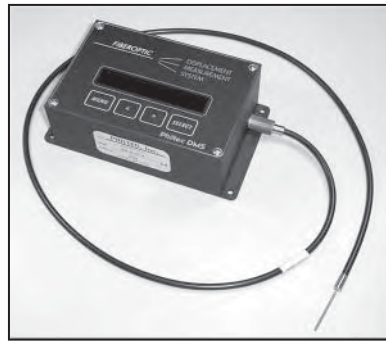
Standard units can be operated locally via keypad or remotely via RS232. They have a 152 x 102 x 57 mm ( 6 x 4 x 2.25 inch) electronics package with 2-line display. RC type DMS units can output *distance and reflectance*. Dual-channel units can display dual channel readings. Price includes RS232 cable, Philtec DMS Setup and Control Software, Labview™ drivers, a 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 Maximum Data Rate per RS232 port
- Peak-to-Peak Amplitudes
- Tared Readings
- Total Runout, T.I.R.



D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
DMS-D6	2070
DMS-D12	1915
DMS-D20	1735
DMS-D21	1775
DMS-D47	1680
DMS-D63	1625
DMS-D64	1700
DMS-D100	1760
DMS-D125	1800
DMS-D169	1890
DMS-D170	1950
DMS-D171	2010

## SINGLE CHANNEL UNITS



RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
DMS-RC12	2490
DMS-RC20	2430
DMS-RC25	2310
DMS-RC60	2340
DMS-RC62	2370
DMS-RC63	2395
DMS-RC90	2430
DMS-RC100	2430
DMS-RC140	2490
DMS-RC171	2490
DMS-RC190	2515

D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
2DMS-D6	3310
2DMS-D12	3060
2DMS-D20	2775
2DMS-D21	2830
2DMS-D47	2675
2DMS-D63	2590
2DMS-D64	2720
2DMS-D100	2815
2DMS-D125	2880
2DMS-D169	3025
2DMS-D170	3120
2DMS-D171	3215

## DUAL CHANNEL UNITS



RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
2DMS-RC12	3985
2DMS-RC20	3695
2DMS-RC25	3695
2DMS-RC60	3745
2DMS-RC62	3795
2DMS-RC63	3830
2DMS-RC90	3890
2DMS-RC100	3890
2DMS-RC140	3985
2DMS-RC171	3985
2DMS-RC190	4020

# Mini-DMS DISPLACEMENT MEASUREMENT SYSTEMS

## with RS232 OUTPUT

These units are streamlined for PC operation only. Available only in single channel packages. They use RS232 protocol with 5,000 samples/sec maximum data rate. The standard length fiberoptic cable is 914 mm (3 Feet). All units include operational software and Labview™ drivers.

D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
mDMS-D6	1510
mDMS-D12	1375
mDMS-D20	1295
mDMS-D21	1315
mDMS-D47	1230
mDMS-D63	1195
mDMS-D64	1255
mDMS-D100	1315
mDMS-D125	1350
mDMS-D169	1445
mDMS-D170	1500
mDMS-D171	1560



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

RC MODELS REFLECTANCE COMPENSATED	
MODEL	UNIT PRICE €
mDMS-RC12	2070
mDMS-RC20	1895
mDMS-RC25	1890
mDMS-RC60	1890
mDMS-RC62	1950
mDMS-RC63	1975
mDMS-RC90	2010
mDMS-RC100	1980
mDMS-RC140	2070
mDMS-RC171	2010
mDMS-RC190	2035

## MULTI-CHANNEL RACKS FOR Mini-DMS SENSORS

MODEL	UNIT PRICE
10DMS	€2875

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 USB or RS232 communication. Price includes RS232 & USB cables, LabView™ drivers and Philtec DMS Control Software.

The rack can be connected with additional racks thereby allowing communication to a larger matrix of sensors.



**10DMS 19" Rack**



**mcDMS**

Sensors are ordered separately.

Specify "mcDMS - model # - options" and the quantity desired. Prices are the same as the mDMS however they use the prefix mcDMS.

For example, mcDMS-RC100-BT1, qty 8.

Any combination of D and RC models can be mixed in the rack.





# Mini-DMS DISPLACEMENT MEASUREMENT SYSTEMS

## with USB OUTPUT

These units are designed for PC operation only. Available only in single channel packages. 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 operational software and Labview™ drivers.

D MODELS REFLECTANCE DEPENDENT	
MODEL	UNIT PRICE €
muDMS-D6	1685
muDMS-D12	1510
muDMS-D20	1510
muDMS-D21	1460
muDMS-D47	1350
muDMS-D63	1320
muDMS-D64	1370
muDMS-D100	1420
muDMS-D125	1480
muDMS-D169	1575
muDMS-D170	1675
muDMS-D171	1720



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-RC12	2145
muDMS-RC20	1990
muDMS-RC25	1980
muDMS-RC60	1980
muDMS-RC62	2035
muDMS-RC63	2060
muDMS-RC90	2090
muDMS-RC100	2060
muDMS-RC140	2145
muDMS-RC171	2090
muDMS-RC190	2110

## with Optional ANALOG OUTPUTS

Specify **Option A** for analog outputs to be included (this feature is only available with USB sensors).

Example: **muDMS-RC100-A**

In addition to the USB output, muDMS sensors are provided with two analog outputs as shown here.

A1 = Linearized distance output, 4.1 volts FS  
A2 = Sensor SNR output, 4.1 volts FS

Each analog output is updated at a 5 KHZ sample rate.

The analog outputs are active when the sensor is powered up. A PC is required only for the purpose of setting the SNR level and sensor temperature control.

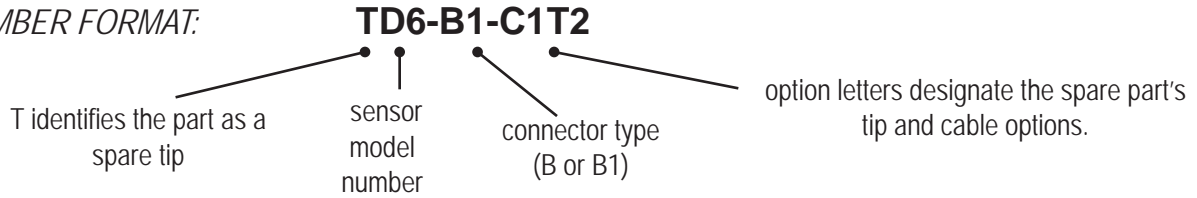


## OPTIONS FOR DMS SENSORS

FOR D MODELS	FOR RC MODELS	OPTION CODE	FEATURE	UNIT PRICE €
✓	✓	A	PROVIDES ANALOG OUTPUTS FOR $\mu$ DMS SENSORS	240
Y	Y	B	CONNECTORIZES SENSOR SYSTEM WITH IN-LINE CONNECTOR. (D6, RC12 n/a) OPTION B IS ALSO REQUIRED FOR USE WITH VACUUM PASSTHRU FLANGES & ASSEMBLIES Bv2, Bv3, BvF, BvW	510
Y	Y	B1	CONNECTORIZES SENSOR SYSTEM WITH BULKHEAD CONNECTOR (D6 n/a)	510
Y	Y	Bv1	CONNECTORIZES SENSOR SYSTEM WITH SINGLE CHANNEL VACUUM PASSTHRU HARDWARE FOR 10 E-7 TORR. INCLUDES ULTRA-TORR COMPRESSION FITTING (D6, RC12 n/a)	1435
Y	N/A	Bv2	2 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS FOR 10 E-11 TORR (D6 n/a) *see Option B	1895
N/A	Y	Bv3	3 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR RC MODELS FOR 10 E-11 TORR (RC12 n/a), *see Option B.	2575
✓	X	Bv4	4 PORT DUAL CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS FOR 10 E-11 TORR (D6 n/a) *see Option B	3190
Y	Y	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) *see Option B	4680
Y	Y	BvW	WELDABLE SINGLE PORT UHV PASSTHRU FLANGE. 2 REQUIRED FOR D MODELS; 3 REQUIRED FOR RC MODELS. PRICE DOES NOT INCLUDE ELECTRONICS OR LIGHT GUIDES. (D6, RC12 & RC20 n/a) *see Option B	1315
Y	Y	C1	INTERLOCKING STAINLESS STEEL SHEATHING FOR FIBEROPTIC CABLES	120
Y	Y	C2	SILICONE TUBING SHEATHING FOR FIBEROPTIC CABLES	120
Y	Y	C3	SILICONE TUBING OVER TEFLON WRAP SHEATHING FOR FIBEROPTIC CABLES	150
Y	Y	C4	SILICONE TUBING OVER STEEL MONOCOIL SHEATHING FOR FIBEROPTIC CABLES	120
Y	Y	C5	TEFLON OVER SS INTERLOK SHEATHING FOR FIBEROPTIC CABLES	240
Y	Y	C6	PVC OVER NYLON WRAP SHEATHING FOR FIBEROPTIC CABLES	150
Y	Y	C7	TEFLON TUBING SHEATHING FOR FIBEROPTIC CABLES	180
Y	Y	C8	PVC SHRINKWRAP SHEATHING FOR FIBEROPTIC CABLES	90
Y	Y	C9	ANNEALED (semi-rigid) STAINLESS STEEL TUBING	240
Y	Y	C10	SILICONE OVER SS INTERLOK SHEATHING	120
Y	Y	E	EXTRA LENGTH OF FIBEROPTIC CABLE (49 FT. MAX. some models)	24/FT
Y	Y	Fv1 Fv2	LOW VACUUM PASSTHRU FOR 10 E-4 TORR.. PROVIDES SOLID SECTION ON FIBEROPTIC CABLE, COMPRESSION FITTING, AND STAINLESS STEEL INTERLOK SHEATHING ON VACUUM SIDE	390
Y	Y	R	AMBIENT LIGHT REJECTION	120
Y	N/A	S	SIDE-VIEWING SENSOR TIP	420
Y	Y	T1	CUSTOMIZED SENSOR TIP, STRAIGHT	120
Y	Y	T2	CUSTOMIZED SENSOR TIP, STRAIGHT and THREADED	150
Y	Y	T3	CUSTOMIZED SENSOR TIP, NON-METALLIC	150
Y	Y	T4	SIMPLE RIGHT ANGLE TIP	180
Y	Y	T5	SQUARE BODY RIGHT ANGLE TIP, UNTHREADED	240
Y	Y	T6	SQUARE BODY RIGHT ANGLE TIP, THREADED	300
Y	Y	T7	SPECIAL TIP MADE TO CUSTOMER SPECIFICATIONS	RFQ
Y	Y	T8	HIGH TEMPERATURE TIP, 250°C MAX.	180
Y	Y	T9	HIGH TEMPERATURE TIP, 482°C MAX.	360
Y	Y	W	WINDOW PROBE FOR HIGH PRESSURE OR VACUUM	264

# REPLACEABLE (SPARE) SENSOR TIPS

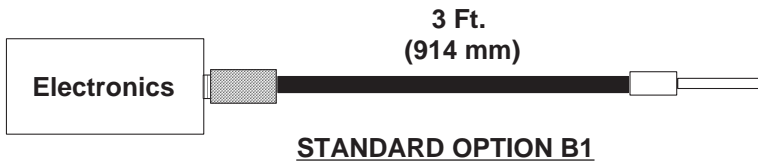
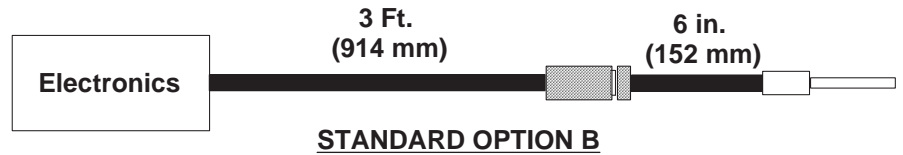
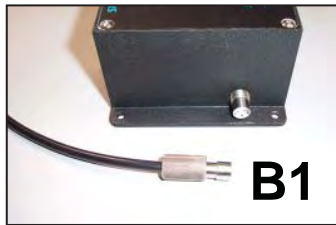
MODEL NUMBER FORMAT:



## 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. We do not recommend more than one connector interface per sensor. Connectorized sensors will have increased noise levels (2 to 3 times higher). Use of connectorized fiber optics with very dark targets is not recommended.

D MODELS REFLECTANCE DEPENDENT	
MODEL	B or B1
TD6	not available
TD12 - TD47	€480
TD63 - TD100	540
TD125 - TD170	600
TD171	660

RC MODELS REFLECTANCE COMPENSATED	
MODEL	B or B1
TRC12	not available
TRC20, TRC60	€540
TRC25, TRC62, TRC63	600
TRC100, TRC171	660
TRC90, TRC140, TRC190	780



# 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** ..... €240 each
- **SENSOR CALIBRATIONS IN FLUID** ..... €330 each

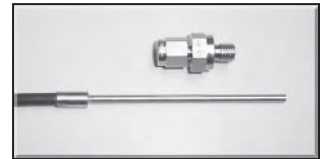
## CALIBRATION CHECK MIRROR

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

- **Model CM32940** ..... €180 each

## COMPRESSION FITTINGS

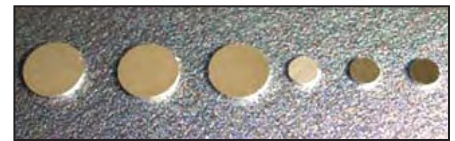
Stainless Steel fittings with nylon compression ferrules can be used to hold sensor tips having 1/8" or 3/16" diameter tips. Overall length is 1.4". They can be bulkhead mounted into a 0.4" deep straight threaded hole.



- **Model CF125** for D63, D64, D100, RC100. Requires 5/16-24 threaded hole ..... €36 each
- **Model CF187** for D169 - D171, RC171. Requires 3/8-24 threaded hole ..... €42 each
- **Model CF312** for RC89, RC90, RC140, RC190. Requires 1/2-20 threaded hole ..... €48 each

## 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 ..... €18 each
- **Model M50**, 1/2" Diameter Disc ..... €30 each

## PROBE MOUNTING BLOCKS

0.6" L x 0.4" W x 0.42" D aluminum block for use with probes having a 1/4" diameter collar. Sensor tips are held by their 1/4" diameter x 1/2" L collar. The block can be mounted on a linear stage to provide a fine active adjustment of the sensor-to-target gap.



- **Model B25**, for any model with Ø1/4" collared probes, ..... €60 each
- **Model B31**, for any model with Ø5/16" collared probes, ..... €90 each

## MICRO-STAGES

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



- **Model 38526** Single Axis Stage, 3 mm Travel ..... €235 each
- **Model 38531** Single Axis Stage, 0.5" Travel ..... €270 each

# ACCESSORIES & SERVICES

## mini-DMS Y-CABLE POWER ADAPTORS

**model PS-1** is required for operation of any mini-DMS sensor. 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-1 ..... € 110 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 ..... € 110 each

## Option Q POWER SUPPLY

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



- Model PS-Q ..... € 86 each

## USB To SERIAL RS-232 ADAPTOR CABLE

**model ADB9** is a 500 Kbps High Speed Adaptor with 6 Foot 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,



- Model ADB9 Serial Adaptor ..... € 55 each

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

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

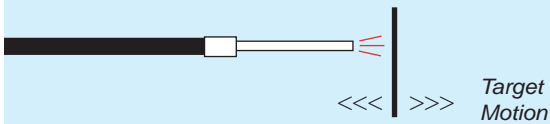


- Model AUSB USB Adaptor ..... € 55 each

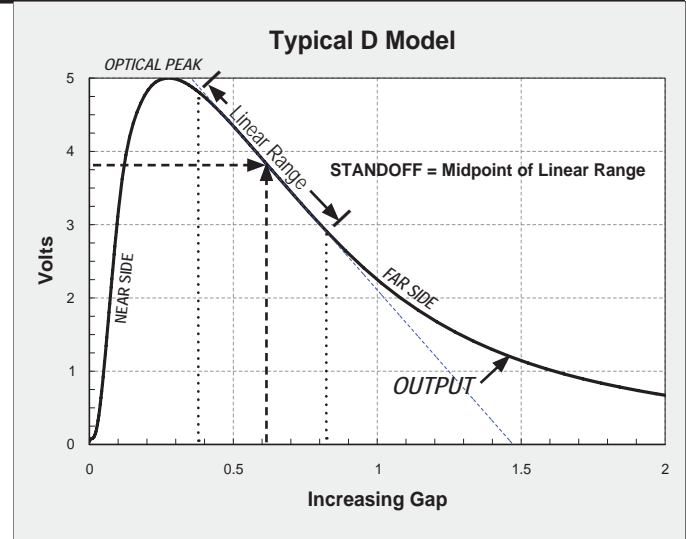
# D Sensors

## “REFLECTANCE DEPENDENT”

Recommended for applications where the target moves along the axis of the sensor...



D sensors provide an output that is proportional to distance as well as the reflectance level of the target. The output function is double-valued: Near Side operation gives highest resolution; Far Side operation gives moderate sensitivity with larger operating range.



### MODEL

Feature	Unit	D6	D12	D20	D21	D47	D63	D64	D100	D125	D169	D170	D171
Tip Diameter	mm	0.81	0.81	0.81	0.81	1.61	3.18	3.18	3.18	3.96	4.76	4.76	4.76
Range	mm	1	2	1.3	2	5	3	6	10	15	20	30	50
Optical Pk.	mm	0.23	0.23	0.13	0.28	.28	0.15	0.3	0.43	0.48	0.56	1	9.6

### NEAR SIDE

Standoff	mm	.05	.08	.03	.08	.09	.03	.08	.08	.08	.08	.1	2.0
Linear Range	mm	.04	.05	.02	.03	.02	.02	.04	.04	.05	.06	.06	1.9
<b>Sensitivity</b>	mv/μm	47	40	80	40	43	90	50	43	40	40	25	0.9
Resolution 100 Hz	μm	.06	.005	.007	.012	.013	.004	.013	.005	.006	.008	.015	0.3
Resolution 20 KHz	μm	.33	.05	.025	.05	.04	.008	.05	.032	.02	.04	.04	0.9
Resolution 200 KHz	μm	1.2	.1	.05	.1	.1	.015	.1	.15	.04	.1	.1	2.5

### FAR SIDE

Standoff	mm	.43	.53	.3	.7	1.75	.66	1.1	2.0	2.1	2.5	4.8	15
Linear Range	mm	.23	.48	.25	.4	1.5	.76	1.4	2.5	2.9	3.5	6.4	6.1
<b>Sensitivity</b>	mv/μm	5	3	8	3	1.4	2.8	1.6	0.8	0.6	0.5	0.3	0.3
Resolution 100 Hz	μm	0.1	.04	.06	.15	.1	.12	.5	.75	.25	.43	1.2	1.7
Resolution 20 KHz	μm	1.3	.4	.25	0.6	.5	.3	1.0	1.5	1.1	1.5	2.5	3
Resolution 200 KHz	μm	4	1.2	.5	1.3	2	0.55	2.0	3.0	1.5	3.8	6.4	10

### APPLICATIONS FOR D SENSORS

Actuator Stroke  
Bearing Vibration  
Diaphragm Deflection  
Displacement In Fluids  
Fuel Injector Dynamics

Impact & Shock Studies  
Parts Positioning  
Piezoelectric Crystal Vibration  
Piston Registration (TDC)  
Piston Stroke

Scratch Detection  
Servo-Control  
Solenoid Travel  
Speed Sensing

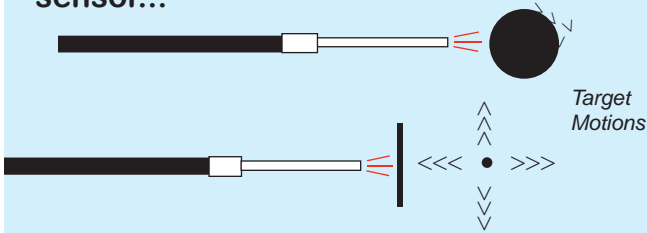
Surface Finish Evaluation  
Turbine Blade Vibration  
Ultrasonic Vibration  
Vacuum Process Control



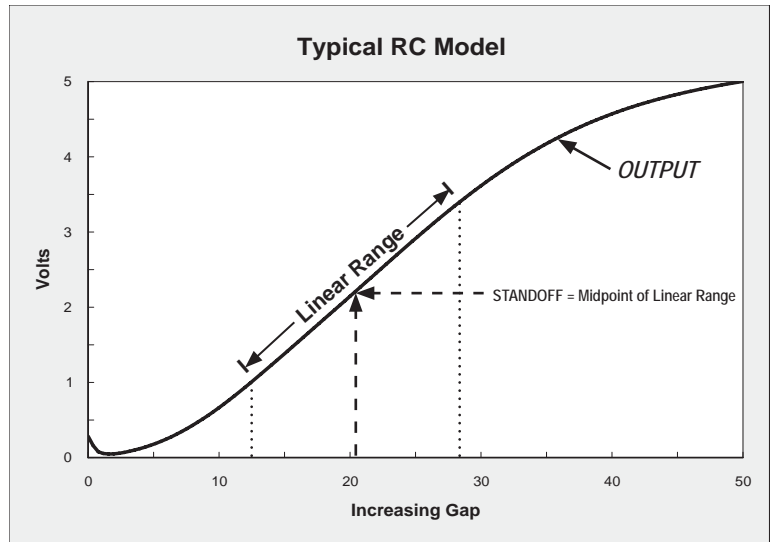
# RC Sensors

## “REFLECTANCE COMPENSATED”

Recommended for applications where the target rotates or moves past the sensor...



RC sensors provide an output signal that is proportional to distance but independent of the reflectance level of the target. The output function is single-valued.



### MODEL

Feature	Unit	RC12	RC20	RC25	RC60	RC62	RC63	RC90	RC100	RC140	RC171	RC190
Tip Diameter	mm	3.18	0.81	7.14	1.83	7.14	7.14	7.93	3.18	7.93	4.75	7.93
Fiberoptics	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
Range	mm	0.5	1.3	0.76	3.2	2	4	9	5	10	12.7	21
Standoff	mm	0.3	.51	0.3	1.5	1	1.4	3.8	2.2	7.5	5.6	12.4
Linear Range	mm	.09	0.4	0.2	1	.64	1.6	2.3	1.8	1.7	4.0	3.3
<b>Sensitivity</b>	mv/µm	21	6	10	2.2	3	1.6	0.8	1.3	6	0.6	0.55
Resolution 100 Hz	µm	.08	.25	.08	0.6	0.25	0.5	1	0.75	0.9	2.5	2.5
Resolution 20 KHz	µm	0.3	1	.3	1.8	1	2	4	3	3.6	7.5	7.5
Resolution 200 KHz	µm	1	2	1	3.6	2	4	8	6	7.1	15	15

**OPERATING PRINCIPLE.** Light is transmitted to the target thru one side of a pair of fiberoptic bundles. Light reflected off the target is captured in two separate fiber bundles which follow independent paths back to the sensor. A ratio-metric calculation provides the distance measurement which is independent of target reflectivity variations; i.e., **reflectance compensated**.



### APPLICATIONS FOR RC SENSORS

Automated Parts Inspection  
Bearing/Rotor Dynamics  
Commutator Profile  
Computer Hard Drive Assembly  
Deformation Studies

Distance To Glass  
Distance To Paper  
Distance To Plastic  
Dynamic Expansion  
Hard Disc Thickness

Process Control  
Rotor Runout  
Shaft Orbits  
Structural Deformation  
Surface Finish Evaluation

Turbine Blade Clearance  
Ultrasonic Vibration  
Ultra-High Vacuum  
Vibration Studies  
Web Dynamics