PHILTEC
FIBEROPTIC SENSORS

DISTANCE | DISPLACEMENT | VIBRATION

Our 30th Year
1985 - 2015

Product Catalog
June 2015

Custom Probes

Bluetooth Wireless Sensors

USB Powered Sensors

Analog Sensors

Vacuum Passthrus

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.

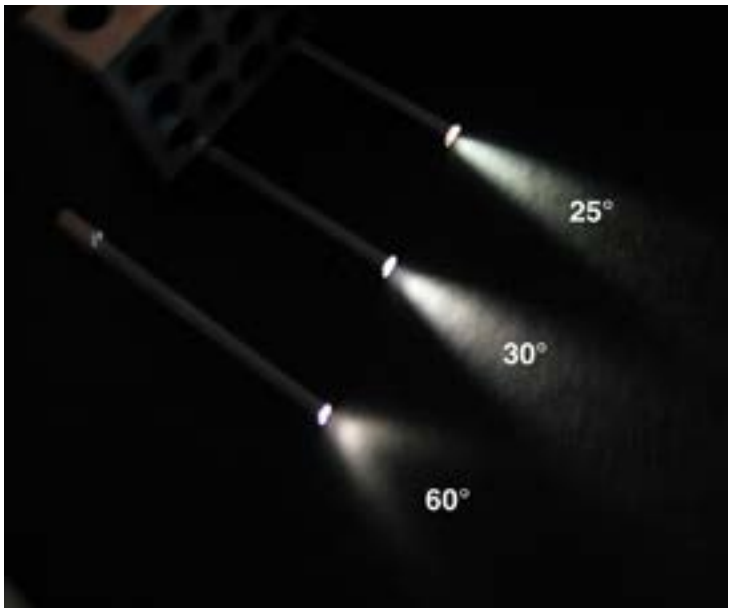
Reflectance Compensated sensors (***RC Models***) provide an output signal proportional to the target gap only. They are blind to (independent of) changes in reflectivity of the target surface.

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.

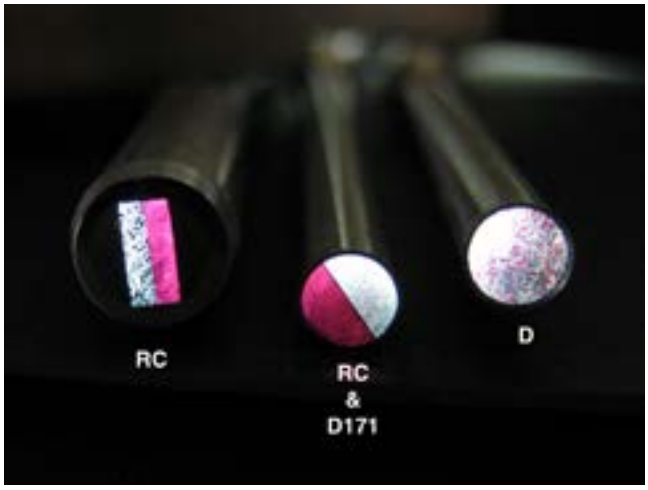


RED LIGHT vs. BLUE LIGHT
- 850 nm red LED light is standard.
- 470 nm blue LED light is optional.
- Blue light is required for hot targets >600°C.
- The reduced wavelength of Blue Light offers benefits with certain materials that absorb red light.
- Select ***Option R2*** for Blue Light

FIBER MIX
D models have a random mix of transmitting and receiving fibers.
*D model*s are always made with round fiber bundles.

RC models are provided with round and rectangular fiber bundles.

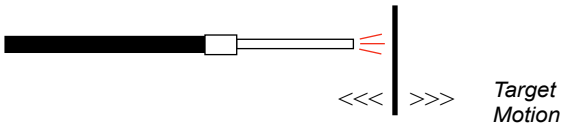
RC models have one transmit bundle and two detector bundles side-by-side.



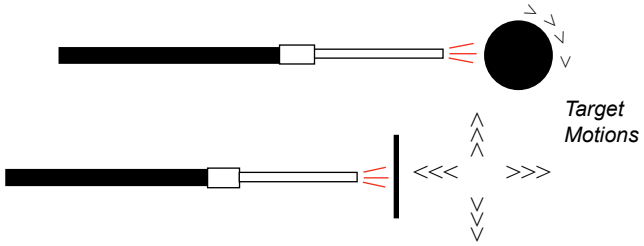
PRICING
All prices in this catalog are based on the use of glass fibers.
****For any quartz fiber application, please submit a request for quotation.***

SENSOR TYPES

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



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



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

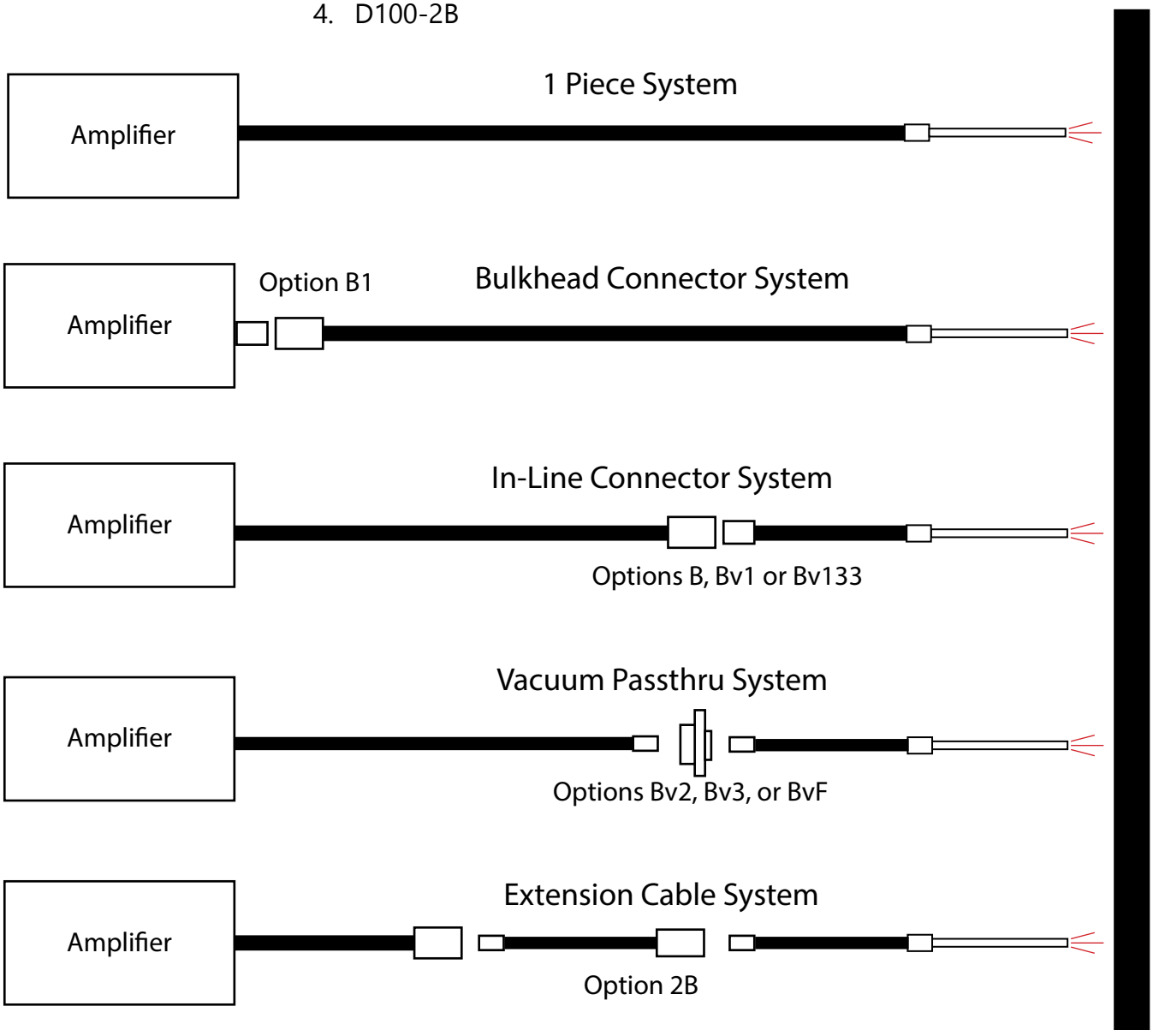
Four types of sensor system configurations can be produced:

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	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	19	750
D170	30	1200
D171	50	2000
D240	75	3000

133 x 67 x 43 mm Enclosure D


140 x 82 x 48 mm Enclosure RC

RC MODELS REFLECTANCE COMPENSATED

MODEL	Operating Range	
	mm	mINCH
RC19	0.76	30
RC20	1.3	50
RC22	3.0	118
RC25	0.76	30
RC32	2	80
RC60	3.2	125
RC62	2	80
RC63	4	160
RC90	9	350
RC100	5	200
RC171	12.7	500
RC190	21	825
RC290	40	1600

OPTIONS FOR ANALOG SENSORS

FOR D MODELS	FOR RC MODELS	OPTION CODE	FEATURE
√	√	A	PROVIDES TEMPERATURE STABILIZED ELECTRONICS FOR LOW DRIFT/HIGH ACCURACY
√	√	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***
√	√	2B	CONNECTORIZES SENSOR SYSTEM WITH TWO IN-LINE CONNECTORS. NOT AVAILABLE FOR ALL MODELS.
√	√	B1	CONNECTORIZES SENSOR SYSTEM WITH BULKHEAD CONNECTOR (D6 n/a)
√	√	Bv1	CONNECTORIZES SENSOR SYSTEM WITH SINGLE CHANNEL VACUUM PASSTHRU HARDWARE FOR 1 E-7 TORR (1 nPa). INCLUDES ULTRA-TORR COMPRESSION FITTING (D6, RC12 n/a)
√	√	Bv133	SAME AS Bv1 WITH 1.33" DIAMETER MINI-CF TYPE FLANGE FOR BULKHEAD MOUNTING
√	N/A	Bv2	2 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS FOR 10 E-11 TORR (10 pPa) (D6 n/a) ***Requires Option B***
N/A	√	Bv3	3 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR RC MODELS FOR 10 E-11 TORR (10 pPa) (RC12 n/a), ***Requires Option B***
√	√	BvF	MULTI-CHANNEL HIGH VACUUM PASSTHRU ASSEMBLY FOR 10 E-7 TORR (1 pPa). CAN ACCOMODATE EIGHT D TYPE OR FIVE RC TYPE SENSORS. (D6, RC12 & RC20 n/a) ***Requires Option B***
√	√	--	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.
√	√	C2	JACKET: SILICONE - MRI AND BIO-COMPATIBLE, AUTOCLAVABLE, FLEXIBLE, LIQUID-TIGHT, NOT CRUSH-PROOF. GOOD TO 200C
√	√	C3	JACKET: SILICONE OVER PTFE WRAP - SEMI-CRUSH-PROOF. GOOD TO 200C. SHORT LENGTHS ONLY
√	√	C4	JACKET: CORRUGATED - ALL PLASTIC. SEMI-CRUSH-PROOF, LIQUID-TIGHT, LIGHT-WEIGHT, MRI COMPATIBLE. GOOD TO 85C.
√	√	C5	JACKET: PTFE OVER STAINLESS STEEL INTERLOK - VAPOR BARRIER, LIQUID-TIGHT, CRUSH-PROOF. GOOD TO 260C.
√	√	C51	JACKET: SS INTERLOK OVER PTFE - VAPOR BARRIER, LIQUID-TIGHT, CRUSH-PROOF, POOR FLEXIBILITY, GOOD TO 260C.

OPTIONS FOR ANALOG SENSORS

FOR D MODELS	FOR RC MODELS	OPTION CODE	FEATURE
√	√	C6	JACKET: PVC OVER NYLON WRAP - SEMI-CRUSH-PROOF, LIQUID-TIGHT, EMF COMPATIBLE. GOOD TO 105C.
√	√	C7	JACKET: PTFE TUBING - AUTOCLAVABLE, MRI & EMF COMPATIBLE, VAPOR BARRIER, LIQUID-TIGHT. GOOD TO 260C.
√	√	C8	JACKET: PVC - POLYVINYL CHLORIDE – VERY FLEXIBLE, LIQUID-TIGHT, EMF & MRI COMPATIBLE, NOT AUTOCLAVABLE, NOT CRUSH-PROOF. GOOD TO 105C.
√	√	C9	JACKET: ANNEALED (semi-rigid) STAINLESS STEEL TUBING. LIQUID TIGHT. GOOD TO 850C.
√	√	C10	JACKET: SILICONE OVER SS INTERLOK SHEATHING. LIQUID-TIGHT, CRUSH-PROOF. GOOD TO 200C.
√	√	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.
√	√	E1	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet, others limited to 49 Feet); ANY FIBER BUNDLE < Ø 2.5 mm
√	√	E2	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet, others limited to 49 Feet); ANY FIBER BUNDLE > Ø 2.5 mm
√	√	Fv1	LOW VACUUM PASSTHRU FOR 10 E-4 TORR (1000 mPa). PROVIDES SOLID SECTION ON FIBEROPTIC 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
√	√	G1	ADDITIONAL OUTPUT, DC COUPLED WITH 10x GAIN and ADJUSTABLE DC OFFSET
√	√	G2	ADDITIONAL OUTPUT, AC COUPLED WITH 10x GAIN
√	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
√	√	L	LOW FREQUENCY AMPLIFIER (< 20 KHz), 100 Hz STD
√	√	+L	ADDITIONAL OUTPUT WITH LOW FREQUENCY BANDWIDTH (< 20 KHz), 100 Hz STD
√	√	M	DIGITAL DISPLAY - DC VOLTS
N/A	√	N	LOW NOISE AMPLIFIER (RC sensors only)
√	√	O	ADJUSTABLE DC OFFSET
√	√	P	POLYNOMIAL CURVE FIT TO SPECIFIED CALCULATION RANGE
√	√	Q	CONNECTORIZED AC/DC POWER ADAPTOR AND BNC OUTPUT
√	√	R1	AMBIENT LIGHT REJECTION
√	√	R2	BLUE LIGHT SENSOR, 470 nm
√	√	T1	TIP: STRAIGHT, CUSTOMIZED
√	√	T2	TIP: THREADED
√	√	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, 350°C MAX.
√	√	T9	TIP: HIGH TEMPERATURE, 480°C MAX.
√	√	T10	TIP: HIGH TEMPERATURE, >480°C (QUARTZ FIBERS)
√	√	T11	TIP: NON-MAGNETIC (BRASS OR ALUMINUM)
√	√	T12	TIP: INVAR (LOW EXPANSION COEFFICIENT)
√	√	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

DIGITAL SENSORS
DISTANCE OUTPUT via RS232

Displacement **M**easurement **S**ystems 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.

SINGLE CHANNEL UNITS

178 x 102 x 57 mm Enclosure

REFLECTANCE DEPENDENT		
MODEL	Operating Range	
	mm	mINCH
DMS-D6	1	40
DMS-D12	2	80
DMS-D20	1.3	50
DMS-D21	2	80
DMS-D47	5	200
DMS-D63	3	120
DMS-D64	6	240
DMS-D100	10	400
DMS-D125	15	600
DMS-D169	19	750
DMS-D170	30	1200
DMS-D171	50	2000
DMS-D240	75	3000

REFLECTANCE COMPENSATED		
MODEL	Operating Range	
	mm	mINCH
DMS-RC19	0.76	30
DMS-RC20	1.3	50
DMS-RC22	3.0	118
DMS-RC25	0.76	30
DMS-RC32	2	80
DMS-RC60	3.2	125
DMS-RC62	2	80
DMS-RC63	4	160
DMS-RC90	9	350
DMS-RC100	5	200
DMS-RC171	12.7	500
DMS-RC190	21	825
DMS-RC290	40	1600

DUAL CHANNEL UNITS

178 x 102 x 57 mm Enclosure

REFLECTANCE DEPENDENT		
MODEL	Operating Range	
	mm	mINCH
2DMS-D6	1	40
2DMS-D12	2	80
2DMS-D20	1.3	50
2DMS-D21	2	80
2DMS-D47	5	200
2DMS-D63	3	120
2DMS-D64	6	240
2DMS-D100	10	400
2DMS-D125	15	600
2DMS-D169	19	750
2DMS-D170	30	1200
2DMS-D171	50	2000
2DMS-D240	75	3000

REFLECTANCE COMPENSATED		
MODEL	Operating Range	
	mm	mINCH
2DMS-RC19	0.76	30
2DMS-RC20	1.3	50
2DMS-RC22	3.0	118
2DMS-RC25	0.76	30
2DMS-RC32	2	80
2DMS-RC60	3.2	125
2DMS-RC62	2	80
2DMS-RC63	4	160
2DMS-RC90	9	350
2DMS-RC100	5	200
2DMS-RC171	12.7	500
2DMS-RC190	21	825
DMS-RC290	40	1600

OPTIONS FOR DIGITAL SENSORS

FOR D MODELS	FOR RC MODELS	OPTION CODE	FEATURE
√	√	A	PROVIDES ANALOG OUTPUTS FOR muDMS SENSORS
√	√	B	CONNECTORIZES SENSOR SYSTEM WITH IN-LINE CONNECTOR. (D6, n/a) **OPTION B IS ALSO REQUIRED FOR USE WITH VACUUM PASSTHRU FLANGES & ASSEMBLIES Bv2, Bv3, Bv4, BvF*
√	√	2B	CONNECTORIZES SENSOR SYSTEM WITH TWO IN-LINE CONNECTORS. NOT AVAILABLE FOR ALL MODELS.
√	√	B1	CONNECTORIZES SENSOR SYSTEM WITH BULKHEAD CONNECTOR (D6 n/a)
√	√	Bv1	CONNECTORIZES SENSOR SYSTEM WITH SINGLE CHANNEL VACUUM PASSTHRU HARDWARE FOR 10 E-7 TORR (1 nPa). INCLUDES ULTRA-TORR COMPRESSION FITTING (D6 n/a)
√	√	Bv133	SAME AS Bv1 WITH 1.33" DIAMETER MINI-CF TYPE FLANGE FOR BULKHEAD MOUNTING
√	N/A	Bv2	2 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS FOR 1 E-11 TORR (10 pPa) (D6 n/a) ****Requires Option B***
N/A	√	Bv3	3 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR RC MODELS FOR 1 E-11 TORR (10 pPa), ****Requires Option B***
√	√	BvF	MULTI-CHANNEL VACUUM PASSTHRU ASSEMBLY FOR 10 E-7 TORR. CAN ACCOMMODATE UP TO 8 D TYPE OR 5 RC TYPE SENSORS. (D6, RC20 n/a) ****also requires Option B***
√	√	--	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.
√	√	C2	JACKET: SILICONE - MRI AND BIO-COMPATIBLE, AUTOCLAVABLE, FLEXIBLE, LIQUID-TIGHT, NOT CRUSH-PROOF. GOOD TO 200C
√	√	C3	JACKET: SILICONE OVER PTFE WRAP - SEMI-CRUSH-PROOF. GOOD TO 200C. SHORT LENGTHS ONLY
√	√	C4	JACKET: CORRUGATED - ALL PLASTIC. SEMI-CRUSH-PROOF, LIQUID-TIGHT, LIGHT-WEIGHT, MRI COMPATIBLE. GOOD TO 85C.
√	√	C5	JACKET: PTFE OVER STAINLESS STEEL INTERLOK - VAPOR BARRIER, LIQUID-TIGHT, CRUSH-PROOF. GOOD TO 260C.
√	√	C51	JACKET: SS INTERLOK OVER PTFE - VAPOR BARRIER, LIQUID-TIGHT, CRUSH-PROOF, POOR FLEXIBILITY, GOOD TO 260C.
√	√	C6	JACKET: PVC OVER NYLON WRAP - SEMI-CRUSH-PROOF, LIQUID-TIGHT, EMF COMPATIBLE. GOOD TO 105C.
√	√	C7	JACKET: PTFE TUBING - AUTOCLAVABLE, MRI & EMF COMPATIBLE, VAPOR BARRIER, LIQUID-TIGHT. GOOD TO 260C.
√	√	C8	JACKET: PVC - POLYVINYL CHLORIDE – VERY FLEXIBLE, LIQUID-TIGHT, EMF & MRI COMPATIBLE, NOT AUTOCLAVABLE, NOT CRUSH-PROOF. GOOD TO 105C.
√	√	C9	JACKET: ANNEALED (semi-rigid) STAINLESS STEEL TUBING. LIQUID TIGHT. GOOD TO 850C.
√	√	C10	JACKET: SILICONE OVER SS INTERLOK SHEATHING. LIQUID-TIGHT, CRUSH-PROOF. GOOD TO 200C.
√	√	C11	JACKET: POLYOLEFIN SHRINK TUBING - THIN WALL MOISTURE/VAPOR BARRIER, NOT CRUSH-PROOF, POOR FLEXIBILITY. GOOD TO 150C.
√	√	E1	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet, others limited to 49 Feet); ANY FIBER BUNDLE < Ø 2.5 mm
√	√	E2	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet, others limited to 49 Feet); ANY FIBER BUNDLE > Ø 2.5 mm
√	√	Fv1	LOW VACUUM PASSTHRU FOR 10 E-4 TORR. PROVIDES Ø 0.375" X 3"L SOLID SECTION ON FO CABLE
√	√	Fv2	LOW VACUUM PASSTHRU FOR 10 E-4 TORR. PROVIDES Ø 0.250" X 3"L SOLID SECTION ON FO CABLE
√	√	Fv3	LOW VACUUM PASSTHRU FOR 10 E-4 TORR. PROVIDES Ø 0.500" X 3"L SOLID SECTION ON FO CABLE
√	√	R1	AMBIENT LIGHT REJECTION
√	√	R2	BLUE LIGHT SENSOR, 470 NM
√	√	T1	TIP: STRAIGHT, CUSTOMIZED
√	√	T2	TIP: THREADED
√	√	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, 350°C MAX.
√	√	T9	TIP: HIGH TEMPERATURE, 480°C MAX.
√	√	T10	TIP: HIGH TEMPERATURE, >480°C (QUARTZ FIBERS)
√	√	T11	TIP: NON-MAGNETIC (BRASS OR ALUMINUM)
√	√	T12	TIP: INVAR (LOW EXPANSION COEFFICIENT)
√	√	W	WINDOW: RECESSED SAPPHIRE EPOXIED INTO TIP FOR HIGH PRESSURE OR VACUUM
√	√	WB	WINDOW: SAPPHIRE BRAZED TO SENSOR TIP FOR HIGH PRESSURE OR VACUUM

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	Operating Range	
	mm	mINCH
mDMS-D6	1	40
mDMS-D12	2	80
mDMS-D20	1.25	50
mDMS-D21	2	80
mDMS-D47	5	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	75	3000

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	Operating Range	
	mm	mINCH
mDMS-RC19	0.76	30
mDMS-RC20	1.25	50
mDMS-RC22	3.0	118
mDMS-RC25	0.76	30
mDMS-RC32	2	80
mDMS-RC60	3.2	125
mDMS-RC62	2	80
mDMS-RC63	4	160
mDMS-RC90	9	350
mDMS-RC100	5	200
mDMS-RC171	12.7	500
mDMS-RC190	21	825
mDMS-RC290	40	1600

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	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	75	3000

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	Operating Range	
	mm	mINCH
muDMS-RC19	0.76	30
muDMS-RC20	1.25	50
muDMS-RC22	3.0	118
muDMS-RC25	0.76	30
muDMS-RC32	2	80
muDMS-RC60	3.2	125
muDMS-RC62	2	80
muDMS-RC63	4	160
muDMS-RC90	9	350
muDMS-RC100	5	200
muDMS-RC171	12.7	500
muDMS-RC190	21	825
muDMS-RC290	40	1600

USB POWERED SENSORS

DISTANCE OUTPUT via USB

Introducing our smallest and most powerful digital sensor with USB output: the microDMS series (µDMS). 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	**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

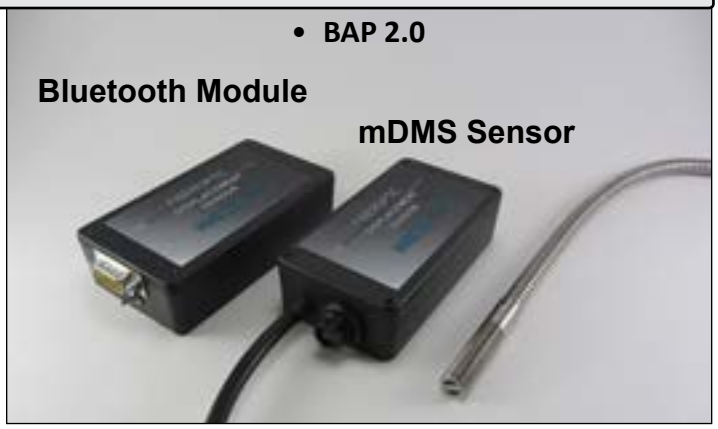
Packaged in a 145 gram enclosure of LWH dimensions 75 x 50 x 23 mm.

RC MODELS REFLECTANCE COMPENSATED		
MODEL	**Operating Range**	
	mm	**mINCH**
muDMS-RC19	0.76	30
muDMS-RC20	1.25	50
muDMS-RC22	3.0	118
muDMS-RC25	0.76	30
muDMS-RC32	2	80
muDMS-RC60	3.2	125
muDMS-RC100	5	200

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.

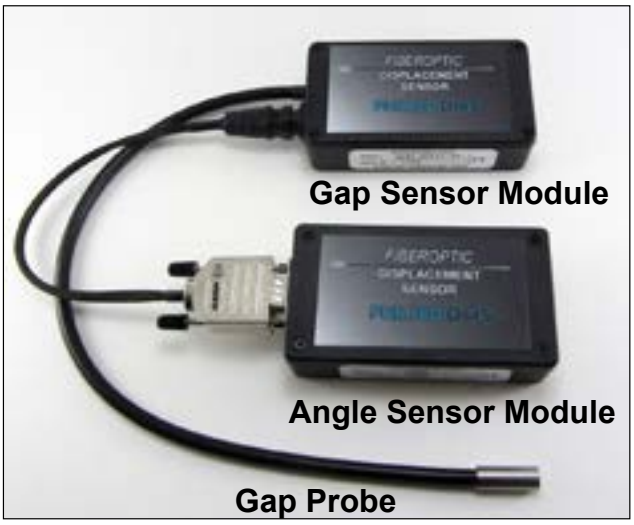
ROUNDNESS MEASUREMENT SYSTEMS

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. Eccenticities 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
CMS 3100	Single
CMS 3200	Dual
CMS-3400	Quad

MULTI-CHANNEL RACKS FOR DIGITAL SENSORS

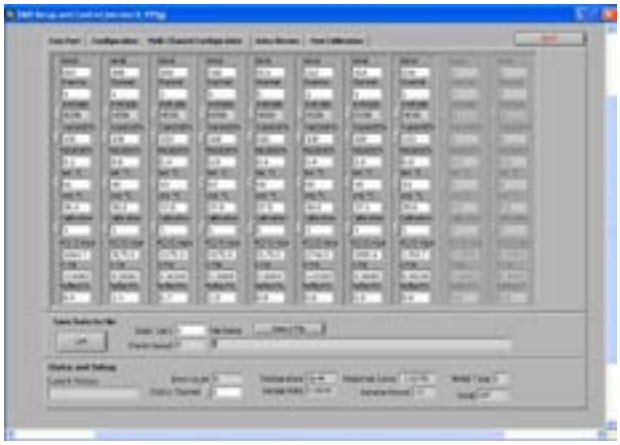
DISTANCE OUTPUT via RS232

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 were 10 sensors can be setup and controlled simultaneously.

10DMS 19" Rack



MODEL
10DMS

<u>Plug-in Sensor Modules are ordered separately:</u>

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

REPLACEABLE SENSOR TIPS

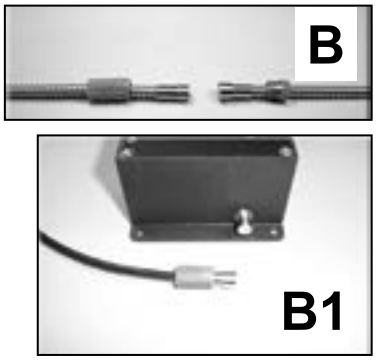
MODEL NUMBER FORMAT: **TD63-B1-C1T2**

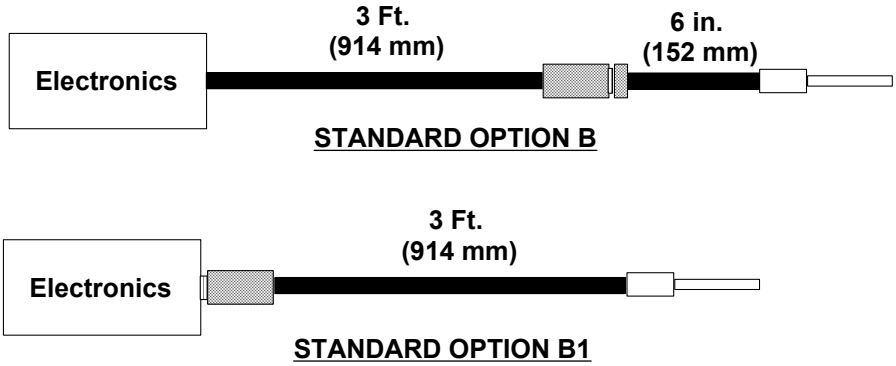
- T identifies the part as a spare tip
- sensor model number
- connector type (B or B1)
- option letters designate the spare part's tip and cable options.

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.

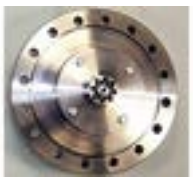
Noise Increases. Custom tips can be provided using any combination of tip, sheathing and length options. However, there are tradeoffs to consider due to light losses at the connector interface. Connectorized sensors have increased noise levels (2 - 3 times higher). Use of connectorized fiberoptics with very dark targets is not recommended.

D MODELS REFLECTANCE DEPENDENT	
MODEL	**Connector**
TD6	not available
TD12 - TD47	**B or B1**
TD63 - TD100	**B or B1**
TD125 - TD170	**B or B1**
TD171	**B or B1**
TD240	**B or B1**

RC MODELS REFLECTANCE COMPENSATED	
MODEL	**Connector**
TRC19, TRC20, TRC22, TRC32, TRC60	**B or B1**
TRC25, TRC62, TRC63	**B or B1**
TRC100, TRC171	**B or B1**
TRC90, TRC190	**B or B1**
TRC290	**B or B1**

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
Bv1	Single / Dual	D or RC	10^{-7}	
Bv133	Single / Dual	D or RC	10^{-7}	
Bv2	Single	D	10^{-11}	
Bv3	Single	RC	10^{-11}	
BvF - CF	Multi	D and RC	10^{-7}	
BvF - ISO	Multi	D and RC	10^{-7}	
Fv1	Single	D or RC	10^{-4}	
Fv2	Single	D or RC	10^{-4}	
Fv3	Single	D or RC	10^{-4}	
W	Single	D or RC	10^{-7}	
Wb	Single	D or RC	10^{-11}	

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.

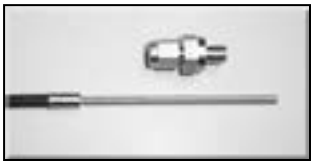
- **SENSOR CALIBRATIONS IN AIR** ..... **cal-A**
- **SENSOR CALIBRATIONS IN FLUID** ..... **cal-F**
- ***NIST TRACEABLE CALIBRATIONS available on request***

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, Ø5 x 2 mm**

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.

- 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 RC90, RC190. 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.

- Ø 6.35 mm (1/4") Disc ..... **Model M25**
- Ø12.7 mm (1/2") Disc ..... **Model M50**

RETRO-REFLECTIVE TAPE

Model RT1, 100 mm square

PROBE MOUNTING BLOCKS

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

- for any model with Ø1/4" collared probes ..... **Model B25**
- for any model with Ø5/16" collared probes ..... **Model B31**

MICRO-STAGES

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

- Single Axis Stage, 0.18" Travel for use with Model B25 Block ..... **Model 56416**
- Single Axis Stage, 0.50" Travel for use with Model B31 Block ..... **Model 56422**

ACCESSORIES & SERVICES

mini-DMS Y-CABLE POWER ADAPTORS

Model PS-1 is required for operaton 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-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.

PS-10

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 cm long, robust dust and waterproof connection, fully shielded providing good levels of noise immunity and EMI protection. For use with muDMS sensors.

AUSB