

Fiber Optic Displacement Sensors

Product Catalog and
Price List 2020



FIBER OPTIC SENSOR SYSTEMS

ROGA Instrument offers you exclusively the complete range of fiber optic sensor systems in cooperation with **Philtex Sensors**.

The product range provides you with

- Reflection dependent "D" sensor systems
- Reflection compensated "RC" sensor systems
- Vacuum sensor systems as a price sensitive alternative to laser interferometric systems e.g. for application in vacuum wafer production
- Electronic components for digital or analog data output. The digital displacement measurement systems (DMS) suite absolute distance measurement, multiplexing and process controlling. The system can sample digital data with a rate up to 5 kHz. Linearised RS232-Output. Calibration data will be saved onboard.
- All sensor systems can be individually personalized to specific client requirements.

PRINCIPLES OF FIBRE OPTIC SENSORS

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.

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

Reflectance Dependent sensors (D Models) provide an output signal proportional to the target gap and also proportional to changes in reflectivity of the target surface. They are most commonly used for single axis motion or vibration.

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

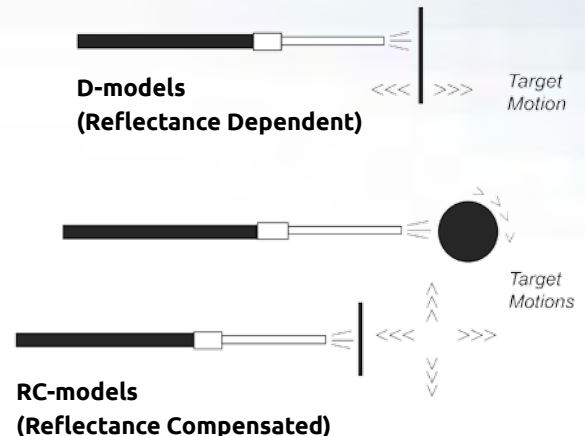
The RC type sensor is a more general purpose optical sensor that can make accurate distance measurements to rotating or translating targets as well as measure part-to-part size variations in production parts.

Reflectance Compensated sensors (RC Models) provide an output signal proportional to the target gap only. They are blind to (independent of) changes in reflectance of the target surface, and are used for measurements to rotating or translating targets. Light is transmitted to the target thru one side of adjacent fiber bundles. The reflected light is captured in two separate fiber bundles which follow independent paths back to the electronics. A ratiometric calculation provides the distance measurement which is independent of target reflectance variations; i.e., reflectance compensated.

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. (For any quartz fiber application, please submit a request for quotation.)



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.

Wavelength of 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 transmit and receive fibers
- are always made with round fiber bundles

FIBER MIX – RC-models

- consist of one transmit bundle and two detector bundles
- are provided with round and rectangular fiber bundles

ALL PRICES IN THIS CATALOG ARE BASED ON THE USE OF GLASS FIBERS.

CONFIGURATION OF FIBRE OPTIC SENSORS AND SYSTEMS

1. CONFIGURATE APPROPRIATE SENSOR

- Choose between D or RC type based upon Direction of Target Motion
- Select Sensor Model based upon range of motion
standoff distance
resolution
target spot size
- Select sensor tip design
- Select fiberoptic cable materials to best fit the application
- Connectorize the system as desired
- Select analog or digital output package

2. CHOOSE SENSOR TYPES

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 in the sensor's linear range of operation

Digitally Controlled Analog Sensors (DCAS)

Standard analog sensors are manually setup using mechanical trim pots. DCAS units are remotely setup using DMS Control Software.

Digital Sensors use RS232 or USB communication and include DMS Control Software.

mDMS Sensors provide distance data via RS232 with 5,000 s/s maximum sampling rate.

muDMS Sensors provide distance data via USB with 5,000 s/s maximum sampling rate.

Wireless Sensors provide:
distance data via USB Bluetooth Micro Adaptor.
900 samples/second maximum sampling rate.
10 Hour Run Time w/full charge.
2 weeks Standby Mode.

3. CONFIGURATE SYSTEM CONFIGURATIONS

Four types of sensor system configurations can be produced:

One Part System

The fiberoptic cable is not detachable from the amplifier.

Two Part System

Has a cable-mounted or amplifier bulkhead-mounted connector.

Three Part Vacuum Passthru System

Has a separate vacuum passthru flange.

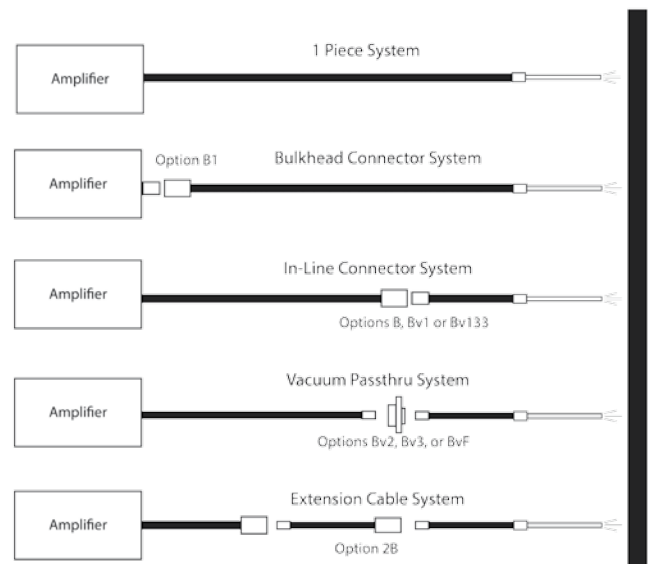
Three Part Extension Cable System

Has two in-line cable connectors.

Model Number Format (e.g. D100-AB1C1ET1)

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

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



PRICES 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.



140 x 82 x 48 mm
Enclosure with barrier
terminal block for input
power and output signal.

D MODELS REFLECTANCE DEPENDENT

Model	Unit Price €
D6	2569,-
D12	2297,-
D20	1923,-
D21	1923,-
D47	1782,-
D63	1700,-
D64	1830,-
D100	1930,-
D125	1980,-
D169	2140,-
D170	2240,-
D171	2330,-
D240	2880,-

RC MODELS REFLECTANCE COMPENSATED

Model	Unit Price €
RC19	3100,-
RC20	3050,-
RC25	2920,-
RC32	2880,-
RC60	2920,-
RC62	3000,-
RC63	3040,-
RC90	3100,-
RC100	3100,-
RC171	3210,-
RC190	3300,-
RC290	4010,-

OPTIONS FOR ANALOG SENSORS

D-models	RC-models	Code	Feature	Unit Price €
✓	✓	A	PROVIDES TEMPERATURE STABILIZED ELECTRONICS FOR LOW DRIFT & HIGH ACCURACY	413,-
✓	✓	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	925,-
✓	✓	2B	CONNECTORIZES SENSOR SYSTEM WITH TWO IN-LINE CONNECTORS. NOT AVAILABLE FOR ALL MODELS.	1850,-
✓	✓	B1	CONNECTORIZES SENSOR SYSTEM WITH BULKHEAD CONNECTOR (D6, RC12 n/a)	925,-
✓	✓	Bv1	CONNECTORIZES SENSOR SYSTEM WITH SINGLE CHANNEL VACUUM PASSTHRU FOR 10 E-7 TORR. INCLUDES ULTRA-TORR COMPRESSION FITTING (D6, RC12 n/a)	2960,-
✓	✓	Bv133	SAME AS Bv1 WITH Ø 1.33" MINI-CF FLANGE FOR BULKHEAD MOUNTING	3520,-
✓	N/A	Bv2	2 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR D MODELS UP TO 10 E-11 TORR, Ø 2.75" CF (D6 n/a), *ALSO REQUIRES OPTION B	3660,-
N/A	✓	Bv3	3 PORT SINGLE CHANNEL VACUUM PASSTHRU FLANGE FOR RC MODELS FOR 10 E-11 TORR, Ø 3.375 CF (RC12, RC19, RC20 n/a), *ALSO REQUIRES OPTION B	5570,-
✓	N/A	Bv4	4 PORT DUAL CHANNEL VACUUM PASSTHRU FLANGE FOR TWO D MODELS UP TO 10 E-11 TORR, Ø 3.375 CF (D6 n/a) *ALSO REQUIRES OPTION B	7060,-
✓	✓	BvF	MULTI-CHANNEL HIGH VACUUM PASSTHRU ASSEMBLY FOR 10 E-7 TORR.CAN HAVE 8 D TYPE OR 5 RC TYPE SENSORS. (D6, RC12 & RC20 n/a) *ALSO REQUIRES OPTION B	8220,-
✓	✓	—	STANDARD JACKET: PVC/MONOCOIL - PVC OVER A STEEL HELICAL WINDING. GOOD FLEXIBILITY, SEMI-CRUSH-PROOF, LIQUID-TIGHT, NOT VACUUM NOR MRI COMPATIBLE. GOOD TO 105C.	--
✓	✓	C1	JACKET: INTERLOCKING STAINLESS STEEL - FLEXIBLE, CRUSH PROOF, NOT LIQUID TIGHT. GOOD TO 850C.	220,-
✓	✓	C2	JACKET: SILICONE COATED FIBERGLASS/STEEL MONOCOIL - FLEXIBLE, SEMI-CRUSH-PROOF. GOOD TO 220C	270,-
✓	✓	C3	JACKET: SILICONE OVER PTFE WRAP - SEMI-CRUSH-PROOF. GOOD TO 200C. SHORT LENGTHS ONLY	270,-
✓	✓	C4	JACKET: CORRUGATED - ALL PLASTIC. SEMI-CRUSH-PROOF, LIQUID-TIGHT, MRI COMPATIBLE. GOOD TO 85C.	200,-
✓	✓	C5	JACKET: PTFE OVER STAINLESS STEEL INTERLOK - VAPOR BARRIER, LIQUID-TIGHT, CRUSH-PROOF. GOOD TO 260C.	460,-
✓	✓	C6	JACKET: PVC OVER NYLON WRAP - SEMI-CRUSH-PROOF, LIQUID-TIGHT, EMF COMPATIBLE. GOOD TO 105C.	250,-
✓	✓	C7	JACKET: PTFE TUBING - MRI & EMF COMPATIBLE, VAPOR BARRIER, LIQUID-TIGHT. GOOD TO 260C.	322,-

OPTIONS FOR ANALOG SENSORS / PRICES

D-models	RC-models	Code	Feature	Unit Price €
✓	✓	C8	JACKET: PVC - POLYVINYL CHLORIDE - VERY FLEXIBLE, LIQUID-TIGHT, EMF & MRI COMPATIBLE. GOOD TO 105C.	160,-
✓	✓	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.	2300,-
✓	✓	C11	JACKET: POLYOLEFIN SHRINK TUBING - THIN WALL MOISTURE/VAPOR BARRIER, NOT CRUSH-PROOF, POOR FLEXIBILITY. Good to 150C.	462,-
✓	✓	C12	JACKET: POLYOLEFIN OVER SS INTERLOK - THIN WALL MOISTURE/VAPOR BARRIER, CRUSH-PROOF, FLEXIBLE. GOOD TO 150C.	560,-
✓	✓	C13	JACKET: FURCATION TUBING- PVC/KEVLAR/PTFE. HIGH TENSILE STENGTH FOR SENSORS < Ø2 MM. GOOD TO 85°C.	230,-
✓	✓	C14	JACKET: BRAIDED SS over PTFE. VERY POOR FLEXIBILITY, LIQUID TIGHT, GOOD FOR HIGH PRESSURE AND 200°C	RFQ
✓	✓	E1	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet or to 49 Feet); ANY FIBER BUNDLE < Ø 2.5 mm	120,-/m
✓	✓	E2	EXTRA LENGTH OF FIBEROPTIC CABLE (some models limited to 10 Feet or to 49 Feet); ANY FIBER BUNDLE > Ø 2.5 mm	180,-/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	850,-
✓	✓	Fv2	LOW VACUUM PASSTHRU, SAME AS Fv1, PROVIDES Ø 0.250" X 3"L SOLID SECTION ON FO CABLE	830,-
✓	✓	Fv3	LOW VACUUM PASSTHRU, SAME AS Fv1, PROVIDES Ø 0.500" X 3"L SOLID SECTION ON FO CABLE	920,-
✓	✓	G1	ADDITIONAL OUTPUT, DC COUPLED WITH 10x GAIN and ADJUSTABLE DC OFFSET	400,-
✓	✓	G2	ADDITIONAL OUTPUT, AC COUPLED WITH 10x GAIN	400,-
✓	N/A	H1	HIGH FREQUENCY AMPLIFIER FOR D MODELS UP TO 200 KHZ BANDWIDTH	300,-
✓	N/A	H2	HIGH FREQUENCY AMPLIFIER FOR D MODELS ABOVE 200 KHZ TO 1 MHZ BANDWIDTH	460,-
N/A	✓	H3	HIGH FREQUENCY AMPLIFIER FOR RC MODELS UP TO 350 KHZ BANDWIDTH	555,-
✓	N/A	+H1	ADDITIONAL OUTPUT FOR D MODELS WITH BANDWIDTHS UP TO 200 KHZ	510,-
✓	N/A	+H2	ADDITIONAL OUTPUT FOR D MODELS WITH BANDWIDTHS UP TO 1 MHZ	740,-
N/A	✓	+H3	ADDITIONAL OUTPUT FOR RC MODELS WITH BANDWIDTHS UP TO 350 KHZ	760,-
✓	✓	L	LOW FREQUENCY AMPLIFIER (< 20 KHz), 100 Hz STD	160,-
✓	✓	+L	ADDITIONAL OUTPUT WITH LOW FREQUENCY BANDWIDTH (< 20 KHz), 100 Hz STD	370,-
✓	✓	M	DIGITAL DISPLAY - DC VOLTS	410,-
N/A	✓	N	LOW NOISE AMPLIFIER (RC sensors only)	200,-
✓	✓	O	ADJUSTABLE DC OFFSET	200,-
✓	✓	P	POLYNOMIAL CURVE FIT TO SPECIFIED CALCULATION RANGE	190,-
✓	✓	Q	CONNECTORIZED AC/DC POWER ADAPTOR AND BNC OUTPUT	200,-
✓	✓	R1	AMBIENT LIGHT REJECTION, 850 ±22.5 nm	230,-
✓	✓	R2	BLUE LIGHT SENSOR, 470 nm	550,-
✓	✓	—	STANDARD STRAIGHT TIP: 200°C CONTINUOUS, 300°C INTERMITTENT	—
✓	✓	T1	TIP: STRAIGHT, CUSTOMIZED	240,-
✓	✓	T2	TIP: THREADED	430,-
✓	✓	T3	TIP: NON-METALLIC, (TORLON OR PEEK)	330,-
✓	✓	T4	TIP: 90° TUBING	390,-
✓	✓	T5	TIP: 90° SQUARE BODY, UNTHREADED END	580,-
✓	✓	T6	TIP: 90° SQUARE BODY, THREADED END	620,-
✓	✓	T7	TIP: MADE TO CUSTOMER SPECIFICATIONS	RFQ
✓	✓	T8	TIP: HIGH TEMPERATURE, 250°C CONTINUOUS, 350°C INTERMITTENT	300,-
✓	✓	T9	TIP: HIGH TEMPERATURE, 400°C CONTINUOUS, 480°C INTERMITTENT	590,-
✓	✓	T10	TIP: HIGH TEMPERATURE, >480°C (QUARTZ FIBERS) please contact the factory	RFQ
✓	✓	T11	TIP: NON-MAGNETIC (BRASS OR ALUMINUM)	300,-
✓	✓	T12	TIP: INVAR (LOW EXPANSION COEFFICIENT)	RFQ
✓	✓	V	PROVIDES SENSOR AMPLIFIER WITH 0 - 10 VOLT OUTPUT	400,-
✓	✓	W	WINDOW: RECESSED SAPPHIRE EPOXIED INTO TIP FOR HIGH PRESSURE OR VACUUM	480,-
✓	✓	wb	WINDOW: SAPPHIRE BRAZED TO SENSOR TIP FOR HIGH PRESSURE OR VACUUM please contact the factory	RFQ

PRICES

DIGITALLY CONTROLLED ANALOG SENSORS WITH VOLTAGE OUTPUT

Standard analog sensors use mechanical trim pots for controlling sensor gains. Digitally controlled analog sensors do not have trim pots. They are setup and controlled via a RS232 serial connection.

These units include sensor amplifier, universal AC/DC Power Adaptor and Y Cable for power input, RS232 Setup and Control. BNC connectors provide 0 to +5 volt outputs with DC - 20 KHz bandwidth standard.



140 x 82 x 48 mm enclosure Includes: Universal AC/DC Power Adaptor, Y Cable Adaptor for power input and signal output, RS232 Cable and Control Software

D MODELS REFLECTANCE DEPENDENT

Model	Unit Price €
DD6	3230,-
DD12	2970,-
DD20	2520,-
DD21	2610,-
DD47	2470,-
DD63	2400,-
DD64	2520,-
DD100	2610,-
DD125	2660,-
DD169	2820,-
DD170	2920,-
DD171	3010,-
DD240	3530,-

D Model Outputs

- STD OUT: 0 to +5 volts
- G1 OUT: 10x Gain with Adjustable DC Offset

RC MODELS REFLECTANCE COMPENSATED

Model	Unit Price €
DRC19	3800,-
DRC20	3710,-
DRC25	3570,-
DRC32	3540,-
DRC60	3580,-
DRC62	3650,-
DRC63	3680,-
DRC90	3740,-
DRC100	3750,-
DRC171	3850,-
DRC190	3950,-
DRC290	4410,-

RCModel Outputs

- STD OUT: 0 to +5 volts
- SNR OUT: 0 to +5 volts

PRICES

DIGITAL SENSORS

DISTANCE OUTPUT VIA RS232

DUAL CHANNEL UNITS

DIGITAL SENSORS

DISTANCE OUTPUT via RS232

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



140 x 61 x 33 mm enclosure includes: universal AC/DC power adaptor, Y cable adaptor for power input and signal output, RS232 cable, RS232 to USB adapter and DMS control software

D MODELS

REFLECTANCE DEPENDENT

Model	Unit Price €
mDMS-D6	2860,-
mDMS-D12	2600,-
mDMS-D20	2200,-
mDMS-D21	2240,-
mDMS-D47	2100,-
mDMS-D63	2020,-
mDMS-D64	2140,-
mDMS-D100	2240,-
mDMS-D125	2290,-
mDMS-D169	2450,-
mDMS-D170	2540,-
mDMS-D171	2630,-
mDMS-D240	3160,-

RC MODELS

REFLECTANCE COMPENSATED

Model	Unit Price €
mDMS-RC19	3430,-
mDMS-RC20	3340,-
mDMS-RC25	3360,-
mDMS-RC32	3170,-
mDMS-RC60	3200,-
mDMS-RC62	3280,-
mDMS-RC63	3320,-
mDMS-RC90	3370,-
mDMS-RC100	3390,-
mDMS-RC171	3480,-
mDMS-RC190	3630,-
mDMS-RC290	4020,-

DIGITAL SENSORS

DUAL CHANNEL UNITS

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



178 x 102 x 57 mm enclosure includes: universal AC/DC power adaptor, RS232 cable and control software

D MODELS

REFLECTANCE DEPENDENT

Model	Unit Price €
2DMS-D6	4580,-
2DMS-D12	4160,-
2DMS-D20	3530,-
2DMS-D21	3580,-
2DMS-D47	3360,-
2DMS-D63	3240,-
2DMS-D64	3440,-
2DMS-D100	3580,-
2DMS-D125	3670,-
2DMS-D169	3920,-
2DMS-D170	4070,-
2DMS-D171	4220,-
2DMS-D240	5060,-

RC MODELS

REFLECTANCE COMPENSATED

Model	Unit Price €
2DMS-RC19	5480,-
2DMS-RC20	5330,-
2DMS-RC25	5390,-
2DMS-RC32	5070,-
2DMS-RC60	5130,-
2DMS-RC62	5240,-
2DMS-RC63	5300,-
2DMS-RC90	5390,-
2DMS-RC100	5410,-
2DMS-RC171	5580,-
2DMS-RC190	5800,-
2DMS-RC290	6430,-

PRICES DIGITAL SENSORS DISTANCE OUTPUT VIA USB

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



140 x 82 x 48 mm enclosure includes: universal AC/DC power adaptor, mini-USB to standard USB adapter cable, DMS control software.

D MODELS REFLECTANCE DEPENDENT

Model	Unit Price €
muDMS-D6	3230,-
muDMS-D12	3010,-
muDMS-D20	2520,-
muDMS-D21	2610,-
muDMS-D47	2470,-
muDMS-D63	2400,-
muDMS-D64	2520,-
muDMS-D100	2610,-
muDMS-D125	2660,-
muDMS-D169	2820,-
muDMS-D170	2920,-
muDMS-D171	3010,-
muDMS-D240	3530,-

RC MODELS REFLECTANCE COMPENSATED

Model	Unit Price €
muDMS-RC19	3800,-
muDMS-RC20	3700,-
muDMS-RC25	3570,-
muDMS-RC32	3540,-
muDMS-RC60	3580,-
muDMS-RC62	3650,-
muDMS-RC63	3680,-
muDMS-RC90	3740,-
muDMS-RC100	3750,-
muDMS-RC171	3850,-
muDMS-RC190	3950,-
muDMS-RC290	4460,-

PRICES MULTI-CHANNEL RACK FOR DIGITAL SENSORS OR ANALOG SENSORS WITH DIGITAL CONTROL

The model **5DMS** is a 19 inch rack mount enclosure for powering and controlling 5 sensor channels as follows:

- 5 digital output sensors, or
- 5 analog output sensors with digital control.

Sensors are provided as plug-in modules for easy installation & removal.

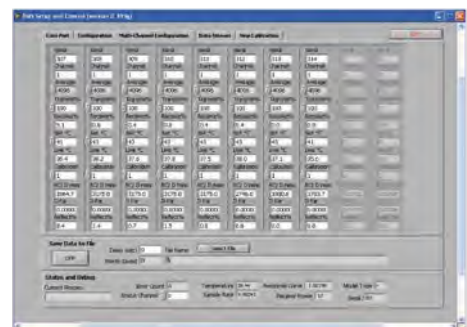
5DMS operates on AC power and is controlled via RS232 or USB communication. The rack can be connected with additional racks thereby allowing communication to a larger matrix of sensors. Any combination of D and RC models can be mixed in the rack.

Sensor Modules are ordered separately:

Specify "mcDMS - model # - options" and the quantity desired. Example: mcDMS-RC100-C1ET1, qty 5.

NOTE: Prices for the modules are the same as the muDMS however they use the prefix mcDMS.

DMS Control Software includes a multi-configuration screen where 10 sensors (2 x 5DMS) can be setup and controlled simultaneously.



MULTI-CHANNEL RACK 5DMS

Model	Unit Price €
5DMS	4070,-

PRICES

WIRELESS SENSORS DISTANCE OUTPUT VIA WIRED RS232 OR WIRELESS MODE

UPGRADE EXISTING SENSORS

WAP2 is an accessory pack enabling any existing or any new mDMS sensor with RS232 output to be operated in wired or wireless modes.

WAP2 accessory pack includes:

- Battery/Radio Module
- USB Wireless Micro Adaptor
- 6 Ft. Mini to Standard USB Cable
- 1 Ft. Datalink Cable
- Operating Software

OPERATION

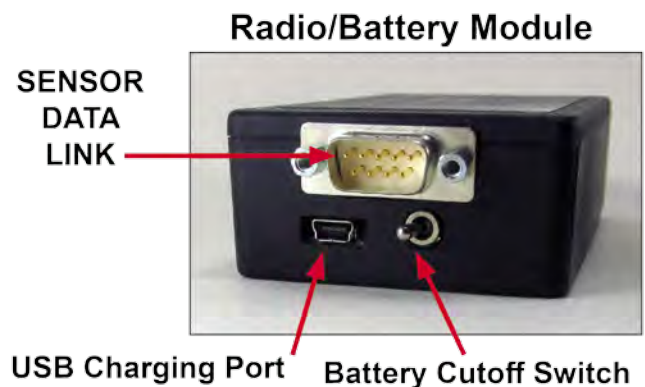
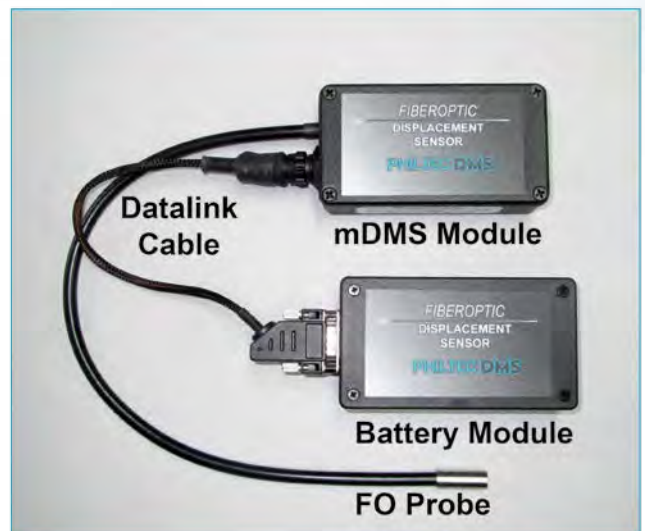
The Wireless Module connects to a PC for battery charging. A data link cable connects the mDMS Module to the Battery Module for wireless operation using DMS Control software.

Specifications

Time To Charge: 4 Hours Run Time: 10 Hours w/full charge
 Standby Mode: 2 Weeks Run Time: 3 Hours After 2 weeks
 Standby Bluetooth Pairing Code: 1234 Max. Data Rate = 900 Samples/Second
 DMS Control Software enables sensor operation & data collection
 Battery Module Packaged in 114 x 64 x 31 mm ABS Plastic enclosure.

WIRELESS UPGRADE KIT

Model	Unit Price €
WAP2	2400,-



PRICES

ROUNDNESS MEASUREMENT SYSTEMS

WIRELESS GAP & ANGLE MEASURES

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

- 20 mm Range Fiberoptic Gap Measuring Probe
- Gap Sensor Electronics Module
- Angle Sensor Electronics Module
- 8" Ultra Rugged Windows Tablet Preloaded with CMS Control Software
- Flash Drive To Offload Data for Analysis

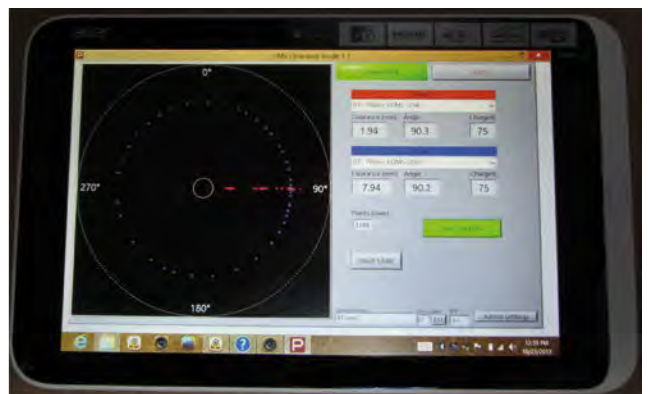
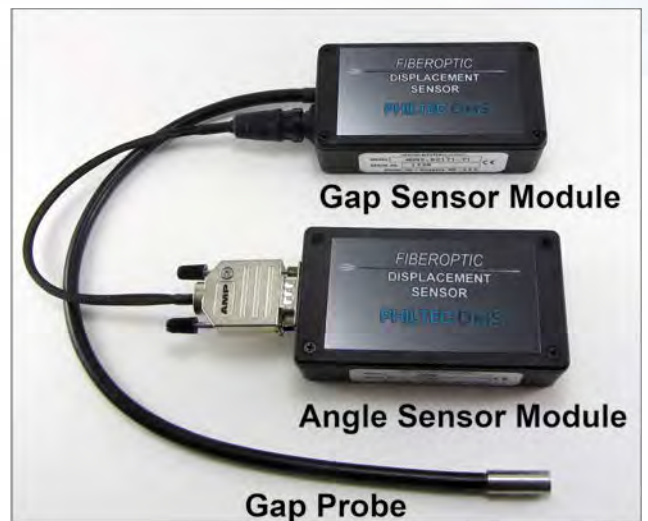
OPERATION

The Gap Probe, Gap Sensor Module and Angle Sensor Module are 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.

Note: The end user provides all the means for mounting and fixturing the CMS components to the turbine blades.

ROUNDNESS MEASUREMENT SYSTEMS

Model	Nbr channels	Unit Price €
CMS 3100	Single	7430,-
CMS 3200	Dual	13900,-
CMS 3400	Quad	27100,-



Tablet for Display and Data Collection

PRICES REPLACEABLE SENSOR TIPS

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.

MODEL NUMBER FORMAT for ordering:

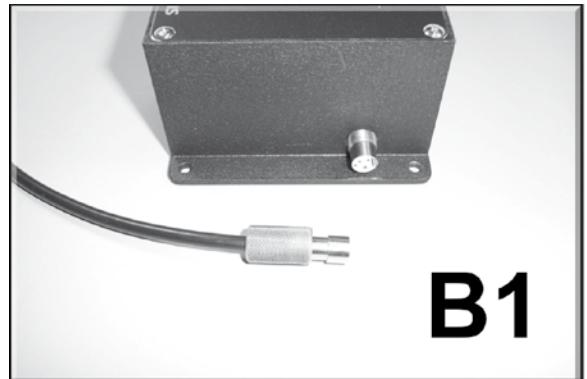
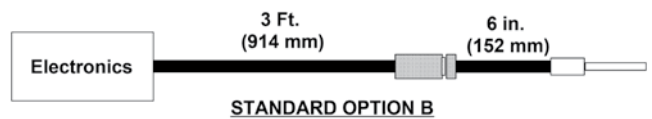
TD63-B1-C1T2

T – identifies the part as a spare tip

D63 – Sensor model number

B1 – Connector type (**B** or **B1**)

C1T2 – Option letters designate the spare part's tip and cable options.



D MODELS REFLECTANCE DEPENDENT

Model	B or B1 €
TD6	not available
TD12 - TD47	920,-
TD63 - TD100	970,-
TD125 - TD170	1060,-
TD171	1200,-
TD240	1400,-

RC MODELS REFLECTANCE COMPENSATED

Model	B or B1 €
TRC19, TRC20, TRC32, TRC60	1100,-
TRC25, TRC62, TRC63	1120,-
TRC100, TRC171	1320,-
TRC90, TRC190	1400,-
TRC290	1650,-

PRICES

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.

VACUUM PASSTHRU HARDWARE / PRICES

Model Option	Sensor Channels	Sensor Type	Torr Rating	Image	Unit Price €
Bv1	Single / Dual	D or RC	10^{-7}		2960,-
Bv133	Single / Dual	Bv2 D or RC	10^{-7}		3500,-
Bv2	Single	D	10^{-11}		3660,-
Bv3	Single	RC	10^{-11}		5580,-
Bv4	Dual	D	10^{-11}	—	7060,-
BvF - CF	Multi	D and RC	10^{-7}		8220,-
BvF - ISO	Multi	D and RC	10^{-7}		8220,-
Fv1	Single	D or RC	10^{-4}		850,-
Fv2	Single	D or RC	10^{-4}		830,-
Fv2	Single	D or RC	10^{-4}		930,-
W	Single	D or RC	10^{-7}		480,-
Wb	Single	D or RC	10^{-11}		RFQ

PRICES 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.

	Price €
Cal-A SENSOR CALIBRATIONS IN AIR	450,- / each
Cal-F SENSOR CALIBRATIONS IN FLUID	670,- / each
FOR NIST TRACEABLE CALIBRATION	add 170,- / each

COMPRESSION FITTINGS

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



	Price €
Model CF63 for D47. Requires 5/16-24 threaded hole	90,- / each
Model CF72 for RC60. Requires 5/16-24 threaded hole	90,- / each
Model CF125 for D63, D64, D100, RC100. Requires 5/16-24 threaded hole	90,- / each
Model CF187 for D169 - D171, RC171. Requires 3/8-24 threaded hole	118,- / each
Model CF250 for Fv2. Requires 7/16-20 threaded hole	120,- / each
Model CF312 for RC90, RC190. Requires 1/2-20 threaded hole	120,- / each
Model CF375 for Fv1, Requires 9/16-18 threaded hole	140,- / each
Model CF500 for Fv3, Requires 3/4-16 threaded hole	150,- / 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.



	Price €
Model M25 , 1/4" Diameter Disc	60,- / each
Model M50 , 1/2" Diameter Disc	100,- / each

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 adjustment of the sensor-to-target gap.



	Price €
Model B25 , 0.6" L x 0.4" W x 0.42" D, for any model with Ø 1/4" collar probes.	110,- / each
Model B31 , 0.75" L x 0.5" W x 0.5" D, for any model with Ø 5/16" collar probes.	150,- / each

PRICES ACCESSORIES & SERVICES

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
- Model 56422** single axis stage, 0.5" travel for use with B31 block

Price €
400,- / each
460,- / each

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.



- Model PS-1**
- Model PS-U**, universal power supply for mini-DMS sensors (power supply only)

Price €
230,- / each
90,- / each

Option Q POWER SUPPLY

Model PS-Q provides a 12 VDC, 500 ma universal AC/DC power supply terminated with a 3 Pin weathertight option Q connector.



- Model PS-Q**

Price €
160,- / 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 & Win 10



- Model ADB9 Serial Adaptor**

Price €
90,- / each

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.



- Model AUSB USB Adaptor**

Price €
100,- / each