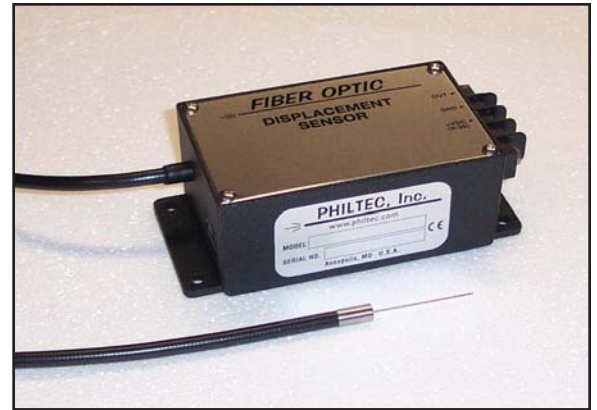


**Fiberoptic Sensor - Reflectance Dependent\***

**Model D20**

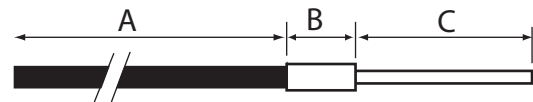


For The Measurement of Distance, Displacement and Vibration

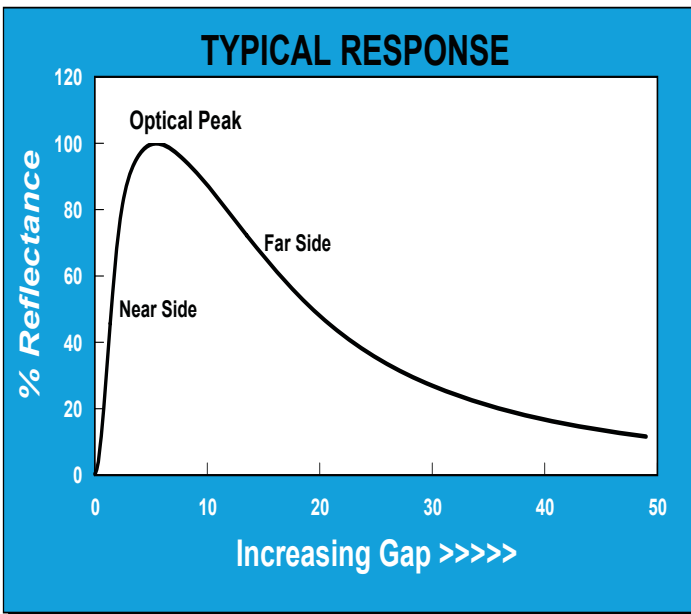
**Features**

- Reflectance Dependent Output with Dual Functions Far Side/Near Side
- Ø 510 Micron Target Spot Size (0.020 inch)
- 1.27 mm Total Operating Range (0.050 inch)
- 8 mv/µm Far Side Sensitivity (210 mv/mil)
- 80 mv/µm Near Side Sensitivity (2000 mv/mil)

**Tip & Cable Dimensions**



| FEATURE                 | mm   | inch  |
|-------------------------|------|-------|
| Tip Outer Diameter, Ø C | 0.81 | 0.032 |
| Fiberoptic Diameter     | 0.5  | 0.020 |
| Tip Length, C           | 38.1 | 1.5   |
| Collar Length, B        | 12.7 | 0.5   |
| Collar Diameter, Ø B    | 6.35 | 0.25  |
| Cable Length, A         | 914  | 36    |
| Cable Diameter, Ø A     | 4.27 | 0.168 |
| Cable Min. Bend Radius  | 19   | 0.75  |



\*These are reflective type transducers based upon detecting the intensity of reflected light. With D Model sensors, the output signal is proportional to: a) the gap distance from the sensor tip-to-target; and, b) the reflectivity of the target surface. D models are commonly used in applications where the target reflectivity stays constant, i.e., the target has a reciprocating or vibratory motion parallel to the axis of the sensor.



## Two Instrument Outputs To Choose From

This sensor can be provided as an analog or as a digital instrument. For available options and how to order go to [www.philtec.com](http://www.philtec.com)

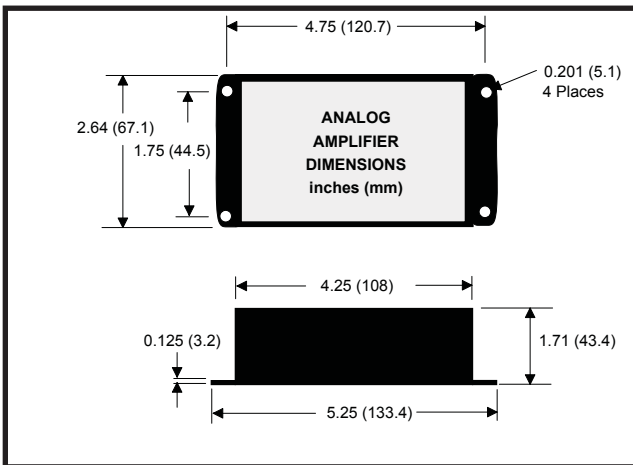


**A**nalog sensors are fast responding units ideal for relative motion measurements in dynamic applications:

- DC-20 KHz is standard
- DC-200 KHz or higher is optional
- DC-100 Hz provides best resolution

Standard analog units include:

- Electronics with 0 to +5 VDC output
- 3 foot long fiberoptic cable



### ANALOG OUTPUT

Calibration charts are provided with each sensor tip giving the near and far side voltage output responses to distance. There are three ways to derive accurate distance measurements:

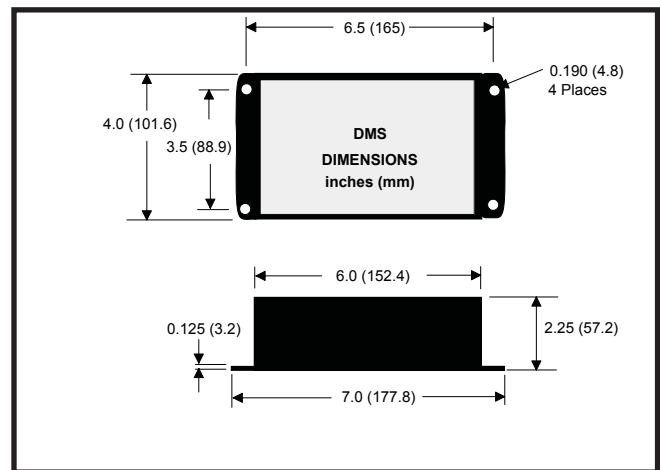
- within the bounds of the linear range, multiply sensitivity by the change in voltage output
- create a lookup table using the XY calibration data points
- use a polynomial curve fit to accurately map the sensor's output function

The effect of changing target reflectance is to shift the voltage output higher or lower. A gain control is provided for calibration of the sensor output to various target surfaces. In-situ calibration is performed simply, by adjusting the sensor's tip-to-target gap until the peak output is attained, and then by using the gain control to set the peak voltage reading to full scale. This allows the sensor to be used to perform precision linear motion measurements on most materials.

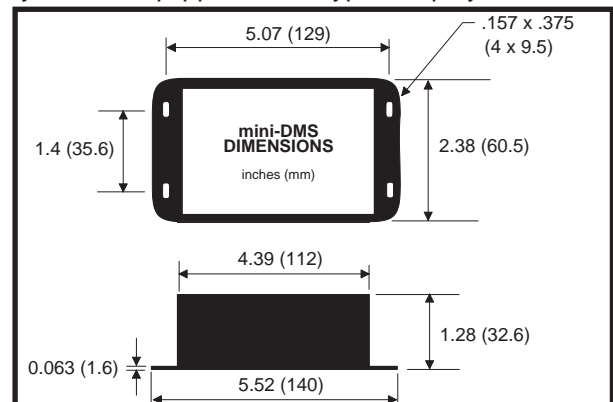
**D**isplacement Measurement Systems (DMS) are the best choice for absolute distance measurements, multiplexing and process control applications, with data rates up to 5,000 readings/second. Two sizes are available:

**Standard DMS** units include:

- Electronics with RS-232 communication
- Keypad/LCD for local operation



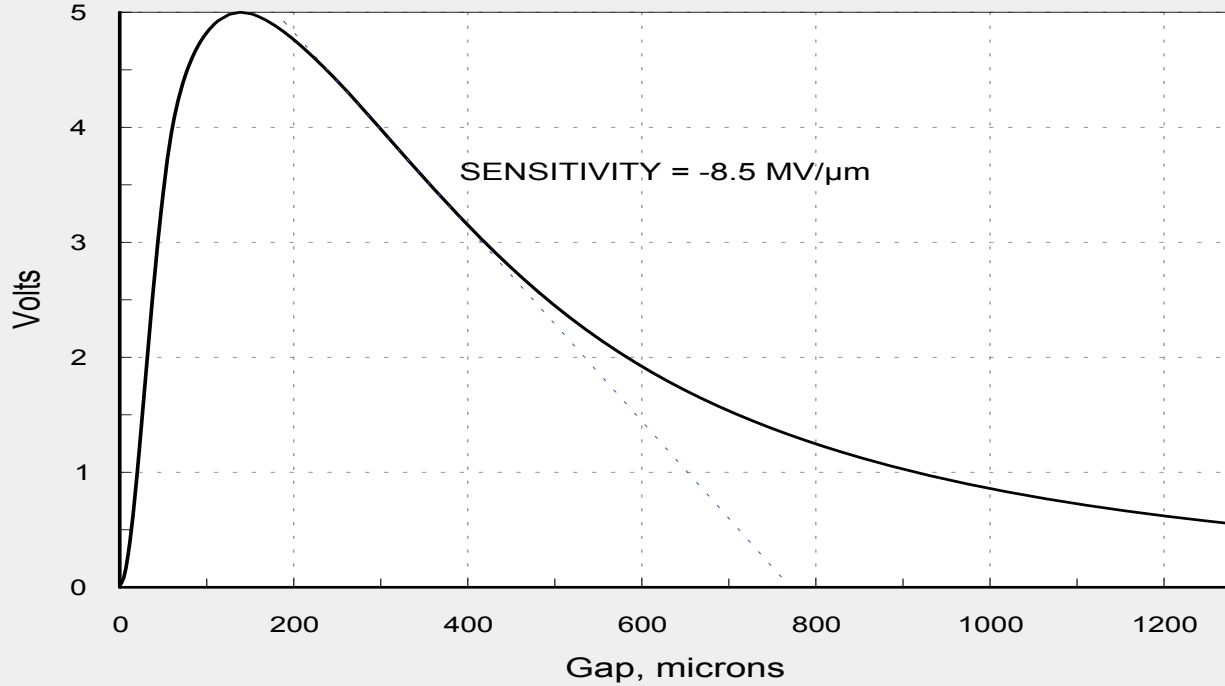
**Mini-DMS** units are full-featured for PC operation only, they are not equipped with keypad/display.



### DIGITAL OUTPUT

DMS units provide distance output via RS232. Gap calibration data is stored on board DMS units. They provide accurate distance measurements over the sensor's entire operating range using a 24 bit internal lookup table. They have storage capacity for many additional calibrations.

## PHILTEC Model D20 Typical Response - Far Side



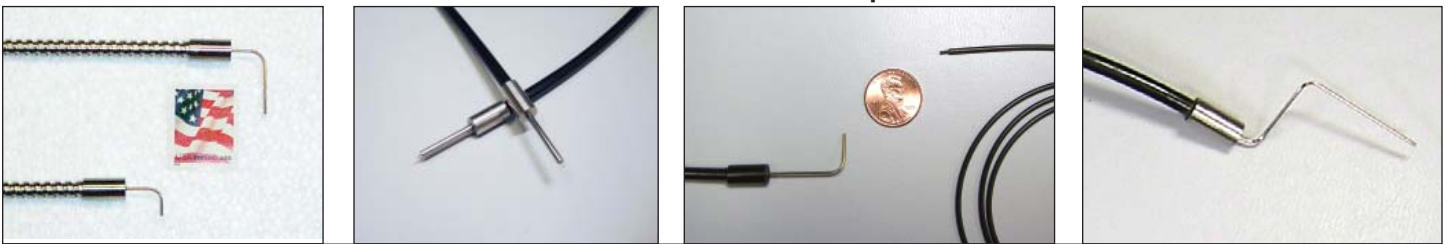
Conversions: 1 micron = 39.37 microinch 1 mm = 39.37 mils 1 mil = 0.001 inch = 25.4 microns = 0.0254 mm

### Standard Specifications - D20 Far Side

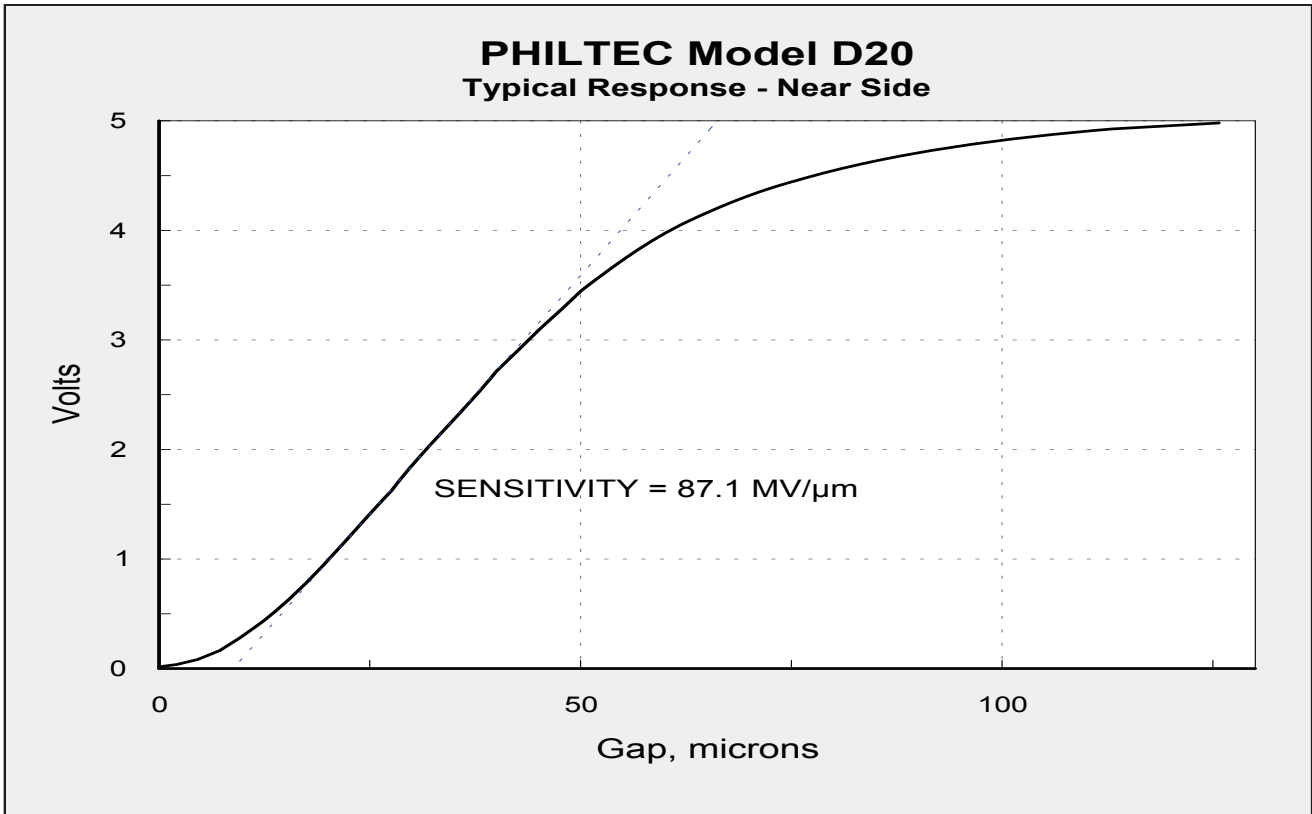
| Electronics       |                        | Fiberoptics |                           | Outputs   |   |                             |                              |   |  |
|-------------------|------------------------|-------------|---------------------------|---|---|-----------------------------|------------------------------|---|--|
|                   | Analog                 | DMS         | Light Beam spread         | 66°   | Analog Voltage  |                             |                              | DMS RS232   |  |
| Light Source      | LED, 880 nm            |             | Cable Sheathing           | PVC over Steel Monocoil                                     | Total Range   | 0.050 in.                   | 1.27 mm                      | Total Range   | 1.27 mm  |
| Input Voltage     | +12 to +24 VDC         | +12 VDC     | Tip Material              | 300 Series SS   | Linear Range  | 0.010 in.                   | 0.25 mm                      | Distance  | 23 bit resolution  |
| Input Current     | 125 ma max             | 500 ma max  | Tip Epoxy Outgas          | 0.3% @ 200°C<br>2.4% @ 300°C                                | Nominal Standoff  | 0.012 in.                   | 0.3 mm                       | Reflectance   | 8 bit resolution   |
| Bandwidth         | DC-20 KHz<br>3 db down | 5 KHz max   | Tip Operating Pressure    | 35 bar  | Sensitivity   | 210 mv/mil                  | 8 mv/μm                      | Amplifier Temperature   | 12 bit resolution  |
| Iso-thermal Drift | 0.5%                   | 0.05%       | Tip Operating Temperature | -55 to 175°C continuous;<br>to 350°C intermittent 1-2 hours | <u>Resolution*</u><br>DC - 200KHz<br>DC - 20 KHz<br>DC - 100 Hz | 20 μin<br>10 μin<br>2.5 μin | 0.5 μm<br>0.25 μm<br>0.06 μm | <u>Resolution*</u><br>Pk-Pk Units<br>at Mid Range<br>using 50% Signal Power | ADC AVG = 2 pk-pk = 400 nm<br>ADC AVG = 16 pk-pk = 250 nm<br>ADC AVG = 256 pk-pk = 80 nm<br>ADC AVG = 4096 pk-pk = 15 nm |

\*These specifications represent best case performance where: the target is flat, smooth and highly reflective, the sensor is perpendicular to the target, the sensor is gapped to its range of highest sensitivity, fiberoptic cable lengths are standard and the cables are not connectorized.

### Custom Hardware To Customer Specifications



**PHILTEC, INC., ANNAPOLIS, MD USA 410-757-4404**  
**800-453-6242 e-mail sensors@philterec.com**



Conversions: 1 micron = 39.37 microinch 1 mm = 39.37 mils 1 mil = 0.001 inch = 25.4 microns = 0.0254 mm

| Standard Specifications - D20 Near Side |                        |            |                           |   |   |                            |                             |   |  |
|---|------------------------|------------|---------------------------|---|---|----------------------------|-----------------------------|---|--|
| Electronics                             |                        |            | Fiberoptics               |   | Outputs   |                            |                             |   |  |
|   | Analog                 | DMS        | Light Beam spread         | 66°   | Analog Voltage  |                            |                             | DMS RS232   |  |
| Light Source                            | LED, 880 nm            |            | Cable Sheathing           | PVC over Steel Monocoil                                     | Total Range   | 5 mils                     | 130 μm                      | Total Range   | 130 μm   |
| Input Voltage                           | +12 to +24 VDC         | +12 VDC    | Tip Material              | 300 Series SS   | Linear Range  | 750 μin                    | 20 μm                       | Distance  | 23 bit resolution  |
| Input Current                           | 125 ma max             | 500 ma max | Tip Epoxy Outgas          | 0.3% @ 200°C<br>2.4% @ 300°C                                | Nominal Standoff  | 1200 μin.                  | 30 μm                       | Reflectance   | 8 bit resolution   |
| Band-width                              | DC-20 KHz<br>3 db down | 5 KHz max  | Tip Operating Pressure    | 35 bar  | Sensitivity   | 2000 mv/mil                | 80 mv/μm                    | Amplifier Temperature   | 12 bit resolution  |
| Iso-thermal Drift                       | 0.5%                   | 0.05%      | Tip Operating Temperature | -55 to 175°C continuous;<br>to 350°C intermittent 1-2 hours | <b>Resolution*</b><br>DC - 200KHz<br>DC - 20 KHz<br>DC - 100 Hz | 2 μin<br>1 μin<br>0.25 μin | 0.05 μm<br>0.025 μm<br>7 nm | <b>Resolution*</b><br>Pk-Pk Units at Mid Range using 50% Signal Power | ADC AVG = 2 pk-pk = 50 nm<br>ADC AVG = 16 pk-pk = 40 nm<br>ADC AVG = 256 pk-pk = 8 nm<br>ADC AVG = 4096 pk-pk = 3 nm |

\*These specifications represent best case performance where: the target is flat, smooth and highly reflective, the sensor is perpendicular to the target, the sensor is gapped to its range of highest sensitivity, fiberoptic cable lengths are standard and the cables are not connectorized.

Many Options are Available Including Replaceable Tips, Vacuum Passthrus and Non-Metallic Tips



**PHILTEC, INC., ANNAPOLIS, MD USA 410-757-4404**  
**800-453-6242 e-mail sensors@philtec.com**