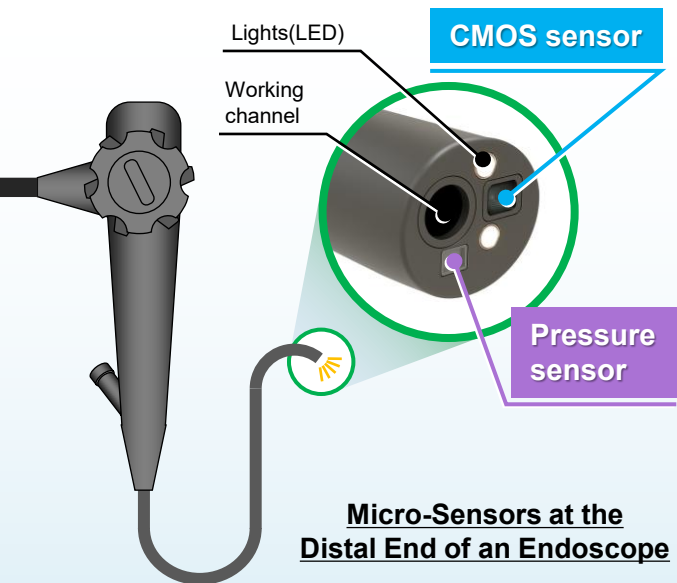


The Growing Role of Micro-Sensor Assemblies in Advanced Medical Devices

Micro-sensors have become indispensable in advanced medical devices such as endoscopes. However, when it comes to connecting these sensors, traditional processing techniques alone are no longer sufficient to address the growing complexity of design challenges. At Proterial, we combine innovative cable design with precision microfabrication technologies to deliver comprehensive solutions for medical device manufacturers. Our integrated approach helps overcome critical development hurdles and accelerates the path to market for next-generation medical devices.

Sensors Integrated in Endoscopes



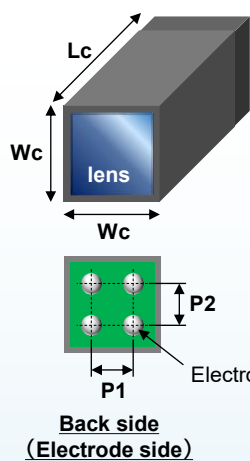
Micro-Sensors at the Distal End of an Endoscope

A wide range of sensors can be integrated into endoscopes depending on their intended application. In addition to **camera sensors -such as CMOS sensors-** that are essential for diagnostic imaging, **pressure sensors** that enable real-time monitoring of internal body pressure have become increasingly important in recent years. Furthermore, as minimally invasive procedures drive the need for smaller-diameter endoscopic devices, the sensors incorporated within them must also be miniaturized. This trend has made challenges related to cable connections and assembly even more prominent. Our company develops cable-processed products designed to support these various sensors. We offer customized cable designs and assembly structures tailored to the specifications and manufacturing requirements of endoscopic devices, delivering **“Total Solution”** that address the development challenges faced by medical device manufacturers.

Challenges of Micro-Sensor assembly

Although sensor dimensions vary by type, this section highlights two categories in which we have extensive experience: CMOS image sensors and pressure sensors.

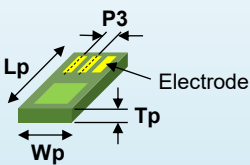
CMOS sensor



Type A	Size(mm)
Side length(Wp)	1.10
Length(Lp)	2.26
Pitch(P1)	0.47
Pitch(P2)	0.40

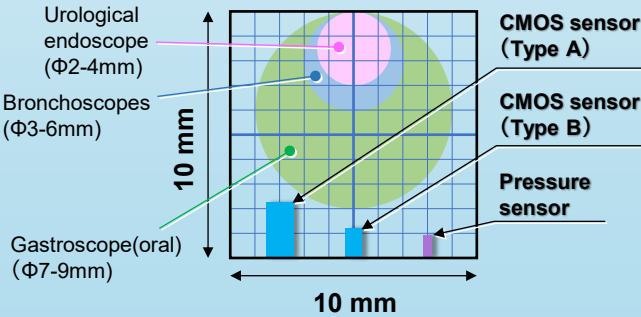
Type B	Size(mm)
Side length(Wp)	0.65
Length(Lp)	1.20
Pitch(P1)	0.20
Pitch(P2)	0.20

Pressure sensor



	Size(mm)
Width(Wp)	0.33
Length(Lp)	0.90
Thickness(Tp)	0.12
Pitch(P3)	0.07

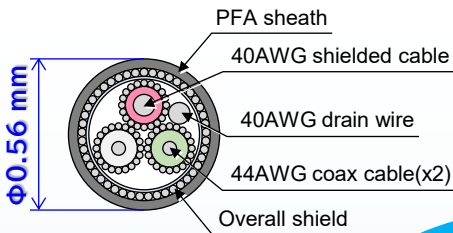
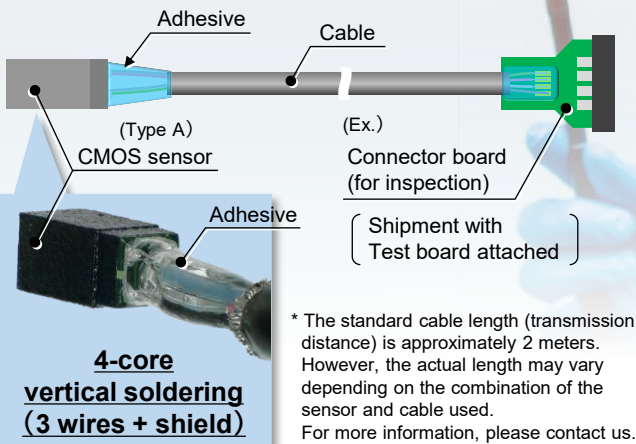
Achieving ultra-thin endoscopic devices requires sensors that are increasingly compact. However, **ensuring a reliable cable connection to such miniature sensors** remains a major technical challenge—and one that continues to pose significant obstacles in development settings.



Comparison of Sensor Sizes

Assembly Structure Example

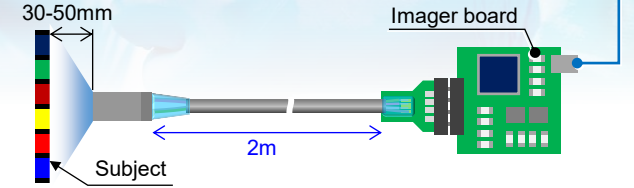
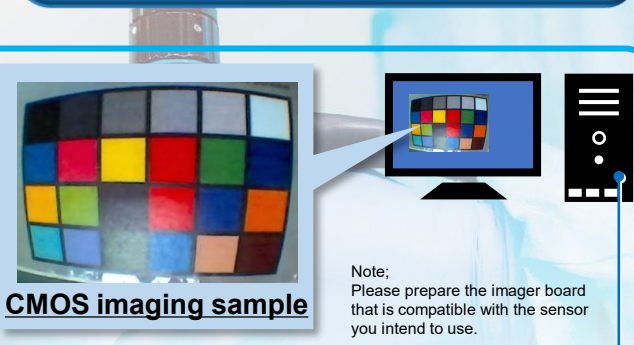
CMOS sensor



Cable Design Example

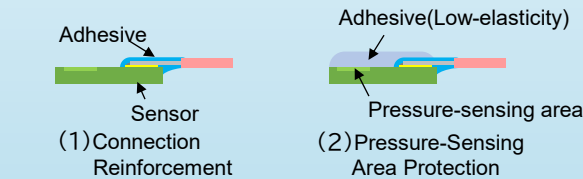
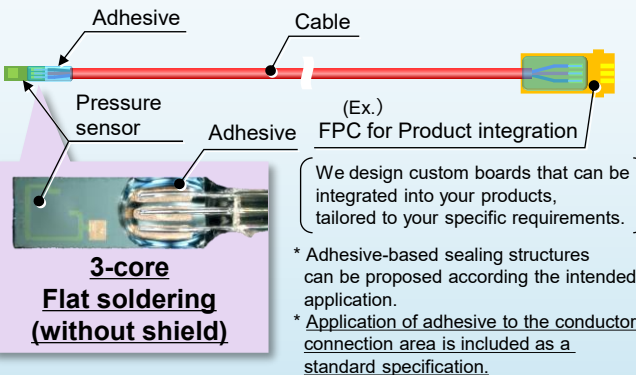
Feel free to reach out for customization!

Sample Data Acquired from Sensors

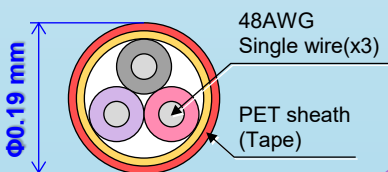


Sensor spec.		Cable spec.	
Size	Type A (1.1 x 1.1 mm)	O.D.	Φ0.56 mm
Resolution	160K pixel	Length	2m
Field of View (FOV)	120°	Overall shield	Available
Depth of Field (DOF)	5-50 mm	Other conditions	
		Illumination	Indoor ambient light only
		Object distance	Approx. 30-50 mm

Pressure sensor

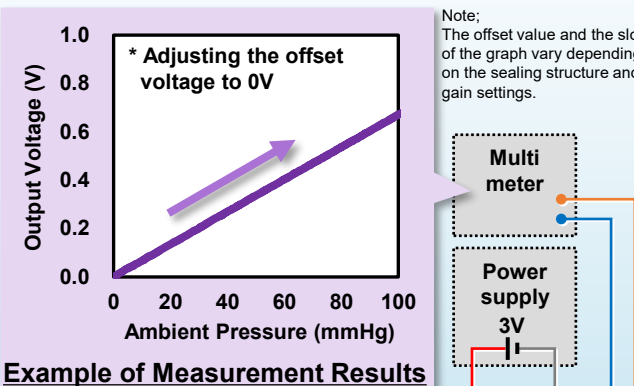


Examples of Sensor sealing Structures

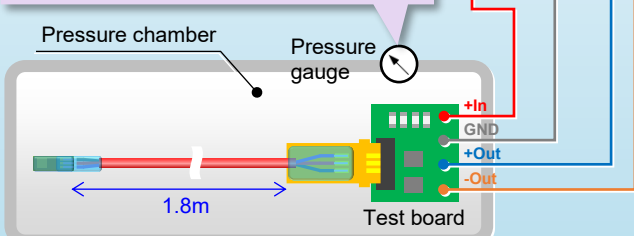


Cable Design Example

Feel free to reach out for customization!



Example of Measurement Results



Measurement conditions		Cable spec.	
Pressure range	0-100mmHg	O.D.	Φ0.19mm
Pressure increase rate	Approx. 1.7mmHg/s	Length	1.8mm
Applied voltage	3V	Other conditions	
		Sealing structure	Pressure-Sensing Area Protection

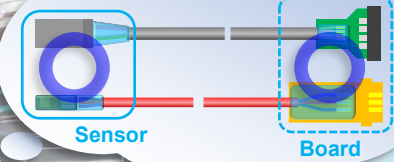
Do you face any of the following challenges?

We would like to connect not only the sensor, but also a **board on the opposite side**.

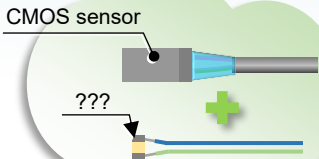


Board connection on the opposite side is also supported.

1. Connection to our standard test board
 2. Connection to a customer-supplied board
 3. Board design provided by our company based on your requirements
- We can accommodate a wide range of requests.



We would like to connect a CMOS sensor and additional tip/sensor using a single cable.



We can also propose structures that allow multiple sensors or components to be connected through a single cable.

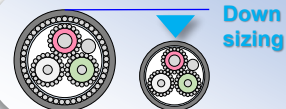
The optimal structure will vary depending on the specific tips and sensors to be connected, so please feel free to consult us first. We can provide proposals ranging from cable design to complete assembly structures.



We would like to route the cable through a narrow tube. Is it possible to **reduce the cable diameter**?



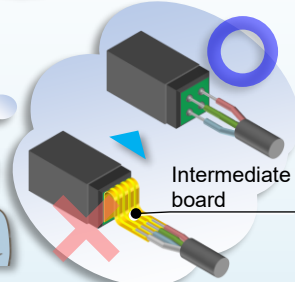
We can design and propose the optimal **small-diameter cable** based on the specifications of the sensor you use, the required transmission distance, and the intended operating environment.



We would like to **make the wiring as compact as possible** due to limited assembly space.



CMOS sensors are typically designed to be surface-mounted on a circuit board. However, our technology enables direct **vertical soldering** of wires to the sensor **without the use of intermediate components such as additional boards**. This structure reduces wiring space and lowers component costs. Of course, we also support assemblies that use CMOS sensors already mounted on a board.



Because the sensor is small and fragile, we would like to **protect it using resin encapsulation**.



We can also provide resin encapsulation (protective sealing)

- **CMOS sensor**
Reinforcement/Insulation of the Connection Area
- **Pressure sensor**
(1) Reinforcement/Insulation of the Connection Area
(2) Protection of Pressure-Sensing Area

* Limited to low-elasticity resin (adhesive)

We can provide recommendations tailored to the sensor type and the intended protection requirements. For more information, please contact us.

