IMI SENSORS
A PCB DIVISION

Sensors With Integral Softline Cable

Written By

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In dusty or wet vibration monitoring applications, sealing of the cable to the sensor is of prime importance in order to avoid contamination of the sensor/cable connection. In these types of environments, sensors with an integral softline cable are an ideal solution as they eliminate the possibility of liquid or particulate infiltration.

Most accelerometers, vibration transmitters and smart switches produced by IMI Sensors have several integral cable options available. Sensors with an integral softline cable can be easily identified by their model designation as the fifth character of the model number defines the connector/cable type. (ie. Model 608A**1**1) See Table 1 below for additional explanation.

Table 1: Definition of Cable/Connector Type Based on Model Designation's Fifth Alphanumeric Character

Character	Connector/Cable Type		Character	Connector/Cable Type
0	2-pin MIL connector		5	10-32 side exit
1	Unarmored, polyurethane-jacketed cable		6	Armored, polyurethane-jacketed cable
2	Unarmored, PTFE-jacketed cable		7	Terminal block connector
3	Bayonet MIL connector		8	2-pin 7/16-27 connector
4	10-32 top exit		9	4-pin M12 connector

APPLICATIONS REQUIRING SENSORS WITH INTEGRAL SOFTLINE CABLE

As seen in Table 1 in the previous section, there are three standard options for integral softline cable- unarmored cable with a polyurethane jacket, unarmored cable with a PTFE jacket and armored cable with a polyurethane jacket. Each of the cable types are designed to meet the requirements of a specific application.

- Unarmored cable with a polyurethane jacket- Ideal for general purpose applications with an ambient temperature below 250 °F and no exposure to caustic elements. (This option is the most commonly-selected integral cable option.)
- Unarmored cable with a PTFE jacket- Ideal for environments with an ambient temperature between 250-392 °F or environments with exposure to caustic elements (ie. acids, acetone, chlorine, fuel oils, salt water).
- Armored cable with a polyurethane jacket- Ideal for environments where objects could pierce, damage or crush the cable.

Specific examples of each of the above-referenced environments are listed in the Table 2.

Table 2: Examples of Applications Requiring Sensors with Integral Softline Cable

Application Type	Application	Unarmored, Polyurethane-Jacketed	Unarmored, PTFE-Jacketed	Armored, Polyurethane-Jacketed
Wet	Industrial Slurry Manufacturing	X		
	Offshore Oil Rigs	X		
	Paper Mills		X	
	Water/Wastewater Treatment	X		
Dusty	Cement Production	X		X
	Coal Processing	X		X
	Graphite Milling	X		
	Grain Milling	X		
	Metal Machining Operations	X		X
	Rice Hulling Facilities	X		
	Rock Quarries	X		X
	Technical Ceramics Production	X		X

TYPES OF INTEGRAL SOFTLINE CABLE

As described in the previous section, each of three standard options for integral softline cable is tailored to specific application requirements. That tailoring is based upon the unique characteristics of each of the cables. An overview of each cable type is provided in Table 3 below.

Table 3: Characteristics of Three Different Types of Integral Softline Cable			
Characteristic	**Unarmored, Polyurethane-Jacketed**	**Unarmored, PTFE-Jacketed**	**Armored, Polyurethane-Jacketed**
Most Common Cable Models	052 (two-conductor) 059 (four-conductor)	055 (two-conductor)	047 (armored 052) 043 (armored 059)
Temperature Range	-58 to +250 °F	-85 to +392 °F	-58 to +250 °F
Bend Radius (Minimum)	2.5 in	1.9 in	4.1 in
Weight	0.67 oz/ft (052) 0.75 oz/ft (059)	0.52 oz/ft	1.61 oz/ft (047) 1.69 oz/ft (043)
Conductors	Stranded AWG 19/32 tin-plated copper		
Conductor Configuration	Twisted Pair or Bundle		
Insulation	Fluorinated ethylene propylene (FEP)		
Shield	Braided with at least 85% coverage		
Cable Jacket Material	Polyurethane	PTFE	Polyurethane
Armor	N/A	N/A	Stainless Steel

CREATING A LASTING SEAL

In order to ensure a water/dust-tight seal between the sensor and the softline cable, a precise manufacturing process is followed.

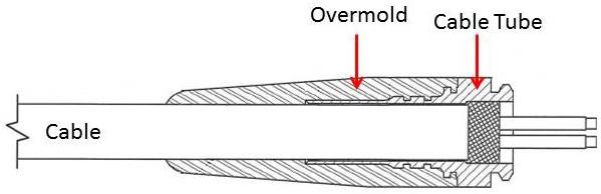

Figure 1: Drawing illustrates the secure fastening of the cable to the cable tube with the use of overmold.

Raw cable is first securely and permanently fastened to the stainless steel cable tube with overmold. After wiring the cable conductors to the element assembly, the entire cable/cable tube/overmold assembly is permanently attached to the sensor housing by welding the exposed portion of the cable tube to the sensor housing.

For product with an integral armored cable, the manufacturing process continues with the armor being attached to the exposed portion of the cable tube in order to provide complete protection for the cable. See Figures 1 and 2.

The manufacturing process concludes with the assembly and attachment of the terminating connector. For most IMI Sensors' products, the customer can select the terminating connector.

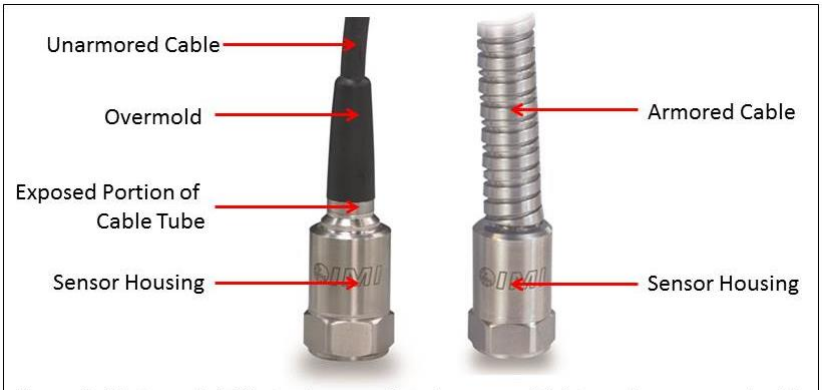

Figure 2: Photo on left illustrates completed sensor with integral unarmored cable while photo on right illustrates completed sensor with integral armored cable.

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