Wilcoxon
SENSING TECHNOLOGIES

A full spectrum of custom cables

Cable assemblies for every application

Wilcoxon Sensing Technologies builds cables to our exacting standards for a variety of applications:

- >> Industrial process
- >> Predictive maintenance
- >> Condition monitoring
- >> Military specifications
- >> Hazardous areas
- >> Test & measurement
- >> Transportation
- >> Underwater
- >> Paper machines
- >> Machine tools
- >> High temperature/radiation resistant
- >> Maritime

Selecting the right cable assembly for a sensor is highly dependent on factors in the environment in which the sensor will operate. It's important to consider the application and the environment to ensure data reliability.

An applications support specialist can help you determine the cable, protection level and connector fittings that meet your needs. Custom cable orders are usually built in less than a week, and many standard cables ship the next day. All cable assemblies are built with care and precision to ensure the quality you've come to expect from Wilcoxon.

Considerations for cable selection

Cable design

	Description	Typical applications
Shielded, twisted pair	Shielded, twisted pair wire.	Permanent sensor installations most often use 2-wire shielded cable because it minimizes electrical noise, including RFI, ESD and EMI and is compatible with standard 2-wire sensors.
Multi-conductor shielded	Shielded, twisted wire for use with 3, 4 or 5 conductors.	Multi-conductor shielded cable is used with 3, 4 or 5 conductor sensors because it minimizes electrical noise.
Coaxial	Carries power and signal on an inner conductor. The shield acts as the signal common.	Coaxial cable is used with BNC connectors and charge output accelerometers. Low-noise mineral insulation cable minimizes triboelectric effects.

Shielding

	Description	Typical applications
Foil	Shielding made of aluminized mylar with a drain wire for electrical connection.	The foil blocks high levels of RF signal, which are often found in wind turbine nacelles or high-speed turbines.
Braided or spiral	Shielding is provided by a braid made from many strands of small gauge wire and wrapped around the conductor(s) of a cable.	Braided shielding is considered more effective at minimizing power line frequencies found around electric motors. Tightly wound braided shield also protects against RF interference.

Cable protection

	Description	Typical applications
Spiral armored jacket	Spiral wrap, interleaved band of metal surrounding a cable.	The spiral armored jacket protects the cable from heavy objects such as those found in a hot roll steel mill, and provides chemical resistance due to the cable's complete isolation from the atmosphere.
Stainless steel overbraid	Braided electrical shield of stainless steel wrapped along the outside of a cable.	A stainless steel overbraid protects the cable from sharp objects and can act as an additional signal shield. For underwater applications, the braid protects the outer insulation from foreign objects and does not trap water.

Environmental resistance

	Description	Typical applications
Teflon®	Best temperature resistance, excellent chemical resistance.	The cable jacket of choice for most applications. Teflon can withstand temperatures up to 260°C, making it ideal for high temperature environments. Teflon is resistant to most chemicals and physically strong, providing long cable life.
Enviroprene	Better chemical resistance in non-abrasive environments.	A low-cost alternative to Teflon. Enviroprene is useful for most environments and protects against common exposures, such as UV rays found in outdoor cable tray installations.
PVC	Good chemical resistance.	PVC is a low-cost solution for dry air installations, but does not provide the same range of chemical resistances as Teflon.
Tefzel®	Better chemical resistance, rated for use in areas where radiation is present.	Radiation resistance makes Tefzel appropriate for use in nuclear environments.
Polyurethane	Low-cost, waterproof material with good abrasion resistance.	Polyurethane is often used in underwater applications because it can be bonded to metals, creating a watertight seal to the sensor.

MaxFlex® cables

MaxFlex cables for data collectors are designed for high performance in the harsh environments of route-based data collection. With reinforced cable joints at the sensor connector end – the most common point of failure for similar cables due to severe handling – MaxFlex cables are reliable, durable, and resistant to wear and tear. They are also compatible with data collectors made by SKF, Emerson (CSI), Rockwell (Entek/IRD), and GE (Commtest).

Why MaxFlex is the best

- >> Extended life
- >> Reinforced for strength and maximum flexibility
- >> Pull tested to over 100 pounds
- >> Excellent EMI / RFI shielding

Durable connectors – built to last

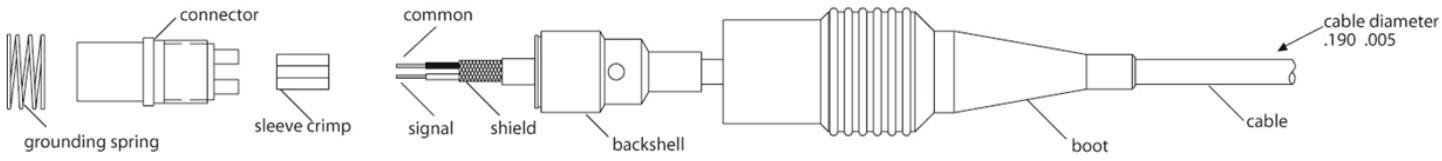
With a wide variety of pin configurations, options for electrical isolation between shield and transducer housing, data collector-compatible connectors and connectors for permanent sensor installations, Wilcoxon has what you need. We offer connector options for a broad range of sensor types, designed to perform under the conditions of any industrial environment.

Connector types

	Description	Typical applications
MIL-style	Rugged, simple and cost-effective connectors available in a variety of pin configurations.	MIL-style is the most common connector used with industrial sensors. They are rugged and offer a wide variety of boots and sealing methods for use in different environments, including splashproof options.
Multi-conductor	LEMO, Bendix, Turck, M12 and other multi-conductor connections.	Multi-conductor connectors are used on data collectors, multi-axis sensors, dual output sensors and triaxial units. M12 connectors are commonly used in process applications.
Coaxial	2-pin connectors for use with coaxial cables.	BNC and 10-32 Microdot connectors reduce the collection time associated with portable data collection.

For harsh environments

Wilcoxon's model 6Q (2-pin MIL-C-5015 connector) boot used with a Teflon® coated cable, such as model J9T2A, has set the standard for ruggedized, submersible connector-cable assemblies. Rated IP68 and tested up to 650 psi, 6Q connectors are usable in temperatures up to 200°C and underwater submersible to a depth of 230 feet. The design of the 6Q allows it to be used both in settings where the cable shield must be connected to the sensor body, and in industrial applications where the shield must be isolated from the sensor (made possible by removing the grounding spring). The pairing of the 6QN neoprene boot and J9T2 Tefzel® cable is an ideal configuration for nuclear environments.



For process applications, Wilcoxon offers the new 6H, 6HI and 6HD2 connectors, designed for use with HART-compatible PCH420V sensors. The 6HD2 boot is suitable for Class I, Division 2 hazardous areas.

Wilcoxon connector tool kits

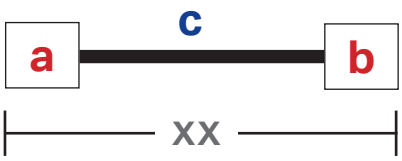
Wilcoxon provides High Temperature Crimp (HTC) and High Temperature Solder (HTS) tool kits for field assembly of 6Q series connectors. The HTC kit is used to make a crimp connection to a socket, while the HTS kit is for applications where the socket will be soldered to the wire. Each kit comes with all the necessary tools to prepare connectors and cables in the field, including high temperature epoxy to backfill the connector, creating a sealed, potted backshell.

How to order

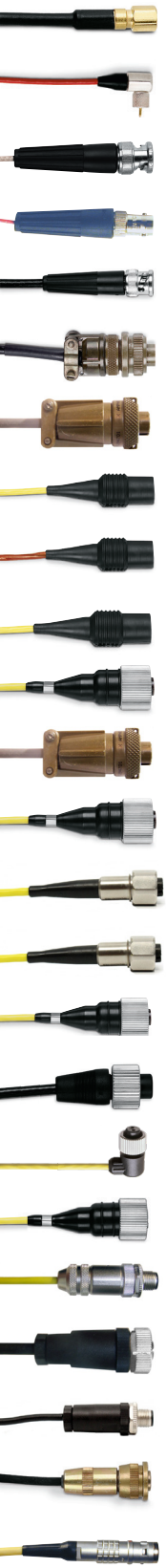
R [a] – [b] – [c] – [xx] – [d]

R signifies cable assembly in Wilcoxon's part numbering system. See the following pages for cable and connector specifications and tech tips.

a	Connector that will mate to sensor
b	Cable termination connector
c	Compatible cable type
xx	Cable length (ft or m), including connectors (standard lengths: 10, 16, 32, 64 ft)
d	Optional: armor (A), stainless steel braid (S), safety connectors (SC)



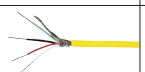
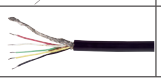
Connector specifications



Connector model		Description	Compatible cables	Max temp	IP rating
Coaxial	1	Microdot 10-32, straight plug	J1, J3, J4, J93	200°C	50
	1A	Microdot 10-32, right angle	J1, J3	200°C	50
	2	BNC, plug, male	J1, J3, J4, J5A, J6, J9T, J9T2, J9T2A, J9T3A, J9T4, J10, J44, J51	165°C	50
	2F	BNC, female	J6, J9, J51, J61, J81, J93	165°C	50
	2T	BNC, twin axial	J9	165°C	50
MIL-C-5015 style	6	Amphenol, 2-socket, metallic	J3, J4, J5A, J6, J9, J9T, J9T2, J9T2A, J10, J51, J61, J81, J93	125°C	50
	6D2	2 pin, suitable for use in Class I Div 2 (Zone 2) areas	J9T2A, J9F	125°C	67
	6Q / 6QI*	2 socket, high temperature	J5A, J9T, J9T2A, J10, J51, J61, J91	200°C	68
	6QA / 6QAI*	2 socket, high temperature	J9F	200°C	67
	6QN / 6QNI*	2 socket, radiation resistant, Neoprene boot/ Tefzel insert	J9T2	105°C	68
	6GQ / 6GQI*	3 socket, high temperature Viton B® boot	J9T3, J9T3A	200°C	68
	6GD2	3 pin, suitable for use in Class I Div 2 (Zone 2) areas	J9T3A	125°C	67
	6GSL / 6GSLI*	3 socket, high temperature Viton B® boot	J9T3, J9T3A	125°C	67
	6H / 6HI*	2 socket, potted backshell, HART-compatible	J9T2, J9T2A	125°C	67
	6HD2	2 socket, HART-compatible, suitable for use in Class I Div 2 areas	J9T2A	125°C	67
	6SL / 6SLI*	2 socket, Viton B® boot	J5A, J9, J9T, J9T2, J9T2A, J9T2AS, J9T3, J9T3A, J9T4, J10, J51, J61	125°C	67
	6W	2 socket, isolated shield, molded connector	J5A, J9T2A, J10	125°C	67
	6WR	2 socket, right angle, molded connector	J9T2A, J10	125°C	67
	19SL / 19SLI*	6 socket	J9T4, J9T4A	125°C	66
M12 style	M12P	4 pin	J84, J88, J10	85°C	67
	M12S	5 socket	J10	85°C	67
	45	5 pin	J95	85°C	67
9W		Bendix, 4 socket, threaded, waterproof	J9T2S, J9T4, J9T4A	125°C	50
20		LEMO, 7 pin	J9T, J9T2A, J10, J61	125°C	50

* I indicates electrical isolation between shield and transducer housing.

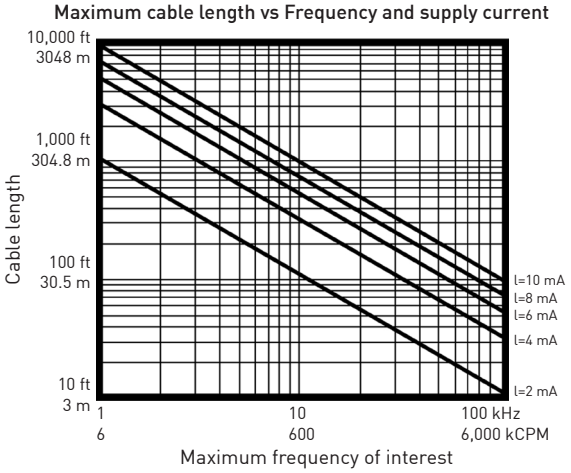
Cable specifications

Cable			Description	Max temp		Diameter		pF/ft
				°C	°F	in.	cm	
Coaxial	J1		Low noise, orange PVC jacket	80°	176°	0.088	0.224	30
	J3		Low noise, high temp, red Teflon jacket	260°	500°	0.085	0.216	30
	J5A		RG58, black PVC jacket	105°	221°	0.190	0.483	30
	J9T		RG59, black Teflon jacket	150°	302°	0.190	0.483	20
	J93		RG316/U, high temp, clear Teflon jacket	200°	392°	0.098	0.249	29
Shielded, twisted pair	J88		Black polyurethane jacket	80°	176°	0.175	0.445	60
	J88C		Black polyurethane jacket, coiled with 6" straight ends	80°	176°	0.175	0.445	60
	J9		Gray PVC jacket	80°	176°	0.231	0.587	32
	J9A		Brown PVC jacket	105°	221°	0.190	0.483	28
	J9T2		White Tefzel jacket, radiation resistant	150°	302°	0.190	0.483	27
	J9T2A		Yellow Teflon jacket	200°	392°	0.190	0.483	27
	J9T2AS		Yellow Teflon jacket with stainless steel braid	200°	392°	0.210	0.533	27
	J9T2B		Blue Teflon jacket	200°	392°	0.210	0.533	27
	J9T2S		White Tefzel jacket with stainless steel braid	150°	302°	0.210	0.533	27
	J96		White Teflon jacket	150°	302°	0.145	0.368	35
	J10		Gray Enviroprene jacket	125°	257°	0.190	0.483	30
	J9F		Foil shield with drain wire, red Teflon jacket	200°	392°	0.125	0.318	51
Multi-conductor shielded	J9T3		3 conductor, white Tefzel jacket	150°	302°	0.190	0.483	27
	J9T3A		3 conductor, yellow Teflon jacket	200°	392°	0.190	0.483	27
	J84		4 conductor, Kevlar reinforced, polyurethane jacket	80°	176°	0.210	0.533	44
	J84C		4 conductor, coiled, Kevlar reinforced, polyurethane jacket	80°	176°	0.210	0.533	44
	J9T4		4 conductor, red Teflon jacket	200°	392°	0.190	0.483	30
	J9T4A		4 conductor, yellow Teflon jacket	200°	392°	0.190	0.483	27
	J95		5 conductor, black polyurethane jacket	90°	194°	0.240	0.610	22

Tech tips

Cable length

An accelerometer cable can be run 100 feet without losing signal content. The exact length before signal degradation begins can be determined using cable capacitance (30 pico-Farads per foot is common) and available voltage swing (typically at least 5 V peak-to-peak). Using these values, the maximum length is a function of supply current and the highest frequency of interest. The chart below helps determine maximum cable lengths.



IP ratings

Splashproof connectors used with sensors are categorized by Ingress Protection or IP rating. IP ratings are industry standards that indicate how connectors withstand invasion in harsh environments. In order to understand the level of sealing provided by a sensor connector, use the chart below.

Protection against solids		Protection against liquid	
No protection	0	0	No protection
Objects >50 mm	1	1	Vertically dripping water
Objects >12.5 mm	2	2	Angled dripping water
Objects >2.5 mm	3	3	Sprayed water
Objects >1.0 mm	4	4	Splashed water
Dust-protected	5	5	Water jets
Dust-tight	6	6	Pressure jets
		7	Immersion to 1 meter
		8	Indefinite immersion

Note: Graph values assume cable capacities of 30 pF/ft and an available swing of 5 V p-p. The current available is represented by I.

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