

Cables

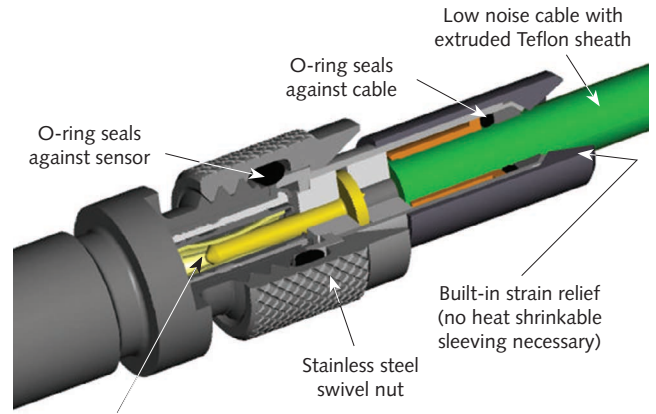
For Force, Torque and Strain Sensors

Charge mode, high impedance piezoelectric measurement demands highly insulated coaxial cables and connectors to ensure an insulation resistance greater than $10^{13} \Omega$ throughout the measuring chain. Only low noise coaxial cables that produce very little triboelectricity during movement may be used. The connectors must be robust, sealed and resistant to dirt.

Kistler connectors have been developed specifically to meet these requirements and are made of stainless steel. Unlike galvanized connectors they are therefore not subject to any wear, and measurement reliability and accuracy are improved. All Kistler connectors contain an O-ring seal at the cable end and the connection end.

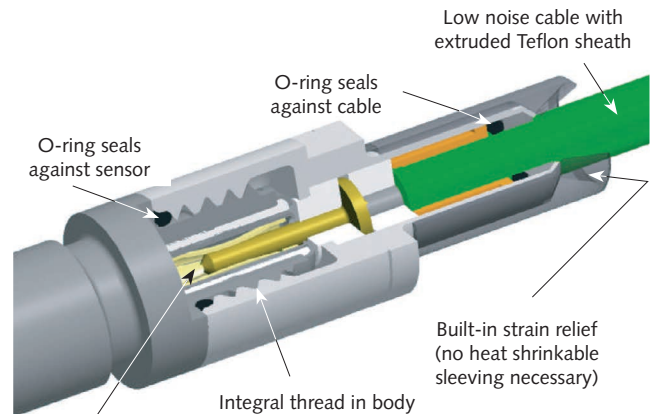
Most Kistler sensors have a connection with a 10-32 UNF or M4 male thread. Connectors with a swivel nut and versions with an integral thread are available for both variants. The one-piece body of the connectors with an integral thread can be welded to the sensor in order to ensure that, for example when the sensor is firmly mounted, the screw connection cannot work loose. For the connection of connectors with an integral thread, cable and sensor must be able to rotate freely in relation to each other.

The selection chart shown on page 2 specifies the type numbers of the most commonly used connecting cables for force, torque and strain sensors. The individual types with available lengths are described on the following pages. The details of multiconductor and special application connecting cables may be found on the corresponding sensor data sheets. The abbreviation pos. stands for male and neg. for female connectors.



Gold-plated center spring made of Beryllium copper
Connector KIAG 10-32 pos.

Fig. 1: Connector with swivel nut

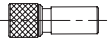
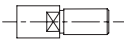
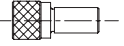
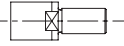

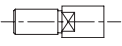
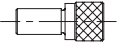
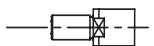
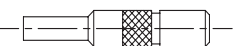






Gold-plated center spring made of Beryllium copper
Connector KIAG 10-32 pos. int.

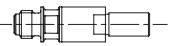
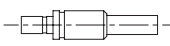

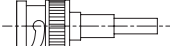



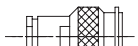
Fig. 2: Connector with integral thread

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Selection Chart for Connecting Cables

M4x0,35 pos.	M4x0,35 pos. int.	KIAG 10-32 pos.	KIAG 10-32 pos. int.	TNC pos.	
					
	1926A...				M4x0,35 pos. int. 
1655C...		1635C... 1957A...			KIAG 10-32 pos. 
	1951A... 1983AB...		1983AC...		KIAG 10-32 pos. int. 
			1943A... 1945A...		Mini-Coax neg. 
1651C...	1923A...	1631C... 1641A...	1939A... 1983AD...	1609B... 1610A... 1619B...	BNC pos. 
		1633C...	1941A...		TNC pos. 
	1645C...				Fischer Coax neg. KE 102A014-14 
			1979A...		Fischer Triax neg. KE 103A015-12 

Selection Chart for Extension and Connecting Cables

KIAG 10-32 neg.	Mini-Coax pos.	BNC neg.	BNC pos.	TNC pos.	
					
1637C...					KIAG 10-32 pos. 
	1937A...	1603B...	1601B...		BNC pos. 
				1615B...	TNC pos. 

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Type 1601B... Connecting Cable BNC

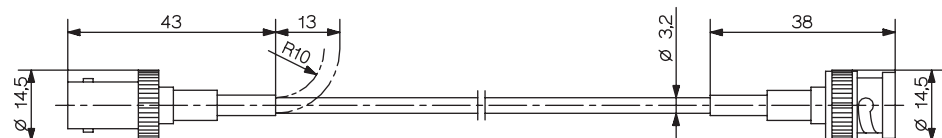
Length (m) 0,5/1/2/5/10/20/sp ($L_{\min} = 0,1 \text{ m}/L_{\max} = 50 \text{ m}$)
 Temperature range $-25 \dots 70 \text{ }^{\circ}\text{C}$



Cable plug BNC pos. Cable PVC black $\varnothing 3,2 \text{ mm}$ BNC pos.
 Degree of protection (EN60529) IP40 IP40

Type 1603B... Extension Cable BNC

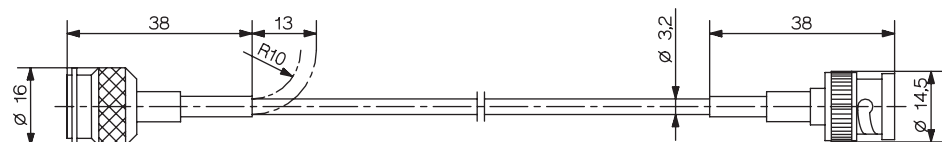
Length (m) 2/5/10/20/50/sp ($L_{\min} = 0,1 \text{ m}/L_{\max} = 50 \text{ m}$)
 Temperature range $-25 \dots 70 \text{ }^{\circ}\text{C}$



Cable plug BNC neg. Cable PVC black $\varnothing 3,2 \text{ mm}$ BNC pos.
 Degree of protection (EN60529) IP40 IP40

Type 1609B... Connecting Cable for Sensors with TNC neg. Connector

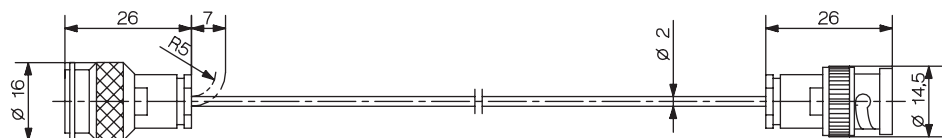
Length (m) 2/5/10/20/50/sp ($L_{\min} = 0,1 \text{ m}/L_{\max} = 50 \text{ m}$)
 Temperature range $-25 \dots 70 \text{ }^{\circ}\text{C}$



Cable plug TNC pos. Cable PVC black $\varnothing 3,2 \text{ mm}$ BNC pos.
 Degree of protection (EN60529) IP40 IP40

Type 1610A... Connecting Cable for Sensors with TNC neg. Connector

Length (m) 2/5/10/sp ($L_{\min} = 0,1 \text{ m}/L_{\max} = 20 \text{ m}$)
 Temperature range $-55 \dots 200 \text{ }^{\circ}\text{C}$

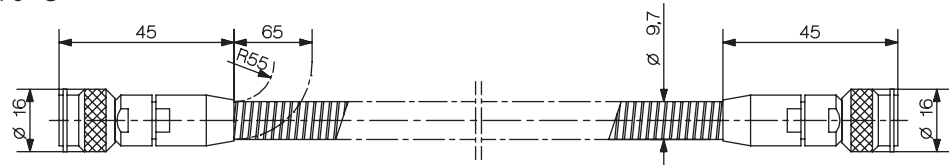


Cable plug TNC pos. Cable PFA green $\varnothing 2 \text{ mm}$ BNC pos.
 Degree of protection (EN60529) IP65 IP40

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Type 1615B... Connecting Cable TNC Armored

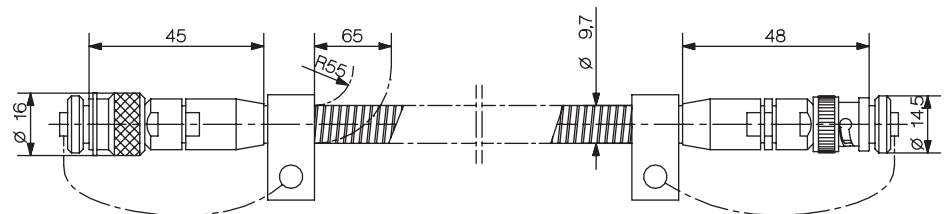
Length (m) 5/sp ($L_{min} = 1$ m/ $L_{max} = 10$ m)
 Temperature range -25 ... 70 °C



Cable plug TNC pos.
 Degree of protection (EN60529) IP65
 Cable PVC black with flexible stainless steel hose ø 9,7 mm
 TNC pos. IP65

Type 1619B... Connecting Cable Armored for Sensors with TNC neg. Connector

Length (m) 5/10/sp ($L_{min} = 1$ m/ $L_{max} = 20$ m)
 Temperature range -25 ... 70 °C



Cable plug TNC pos.
 Degree of protection (EN60529) IP65
 Cable PVC black with flexible stainless steel hose ø 9,7 mm
 BNC pos. IP40

Type 1631C... Connecting Cable for Sensors with KIAG 10-32 neg. Connector

Length (m) 0,5/1/2/3/5/10/20/sp ($L_{min} = 0,1$ m/ $L_{max} = 50$ m)
 Temperature range -55 ... 200 °C



Cable plug KIAG 10-32 pos.
 Degree of protection (EN60529) IP65
 Cable PFA green ø 2 mm
 BNC pos. IP40

Type 1633C... Connecting Cable for Sensors with KIAG 10-32 neg. Connector

Length (m) 0,5/1/2/5/sp ($L_{min} = 0,1$ m/ $L_{max} = 50$ m)
 Temperature range -55 ... 200 °C

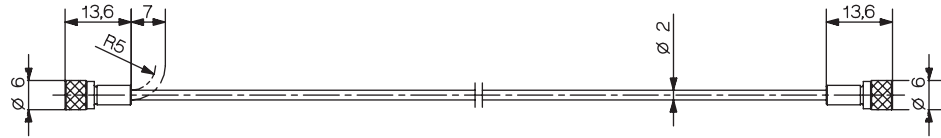


Cable plug KIAG 10-32 pos.
 Degree of protection (EN60529) IP65
 Cable PFA green ø 2 mm
 TNC pos. 1813 IP65

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Type 1635C... Connecting Cable for Sensors with KIAG 10-32 neg. Connector

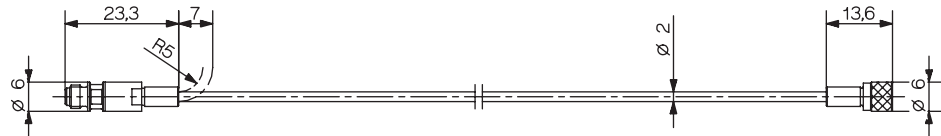
Length (m) 0,5/1/2/5/10/sp ($L_{\min} = 0,1$ m/ $L_{\max} = 15$ m)
 Temperature range $-55 \dots 200$ °C



Cable plug KIAG 10-32 pos. Cable PFA green \varnothing 2 mm KIAG 10-32 pos.
 Degree of protection (EN60529) IP65 IP65

Type 1637C... Extension Cable KIAG 10-32

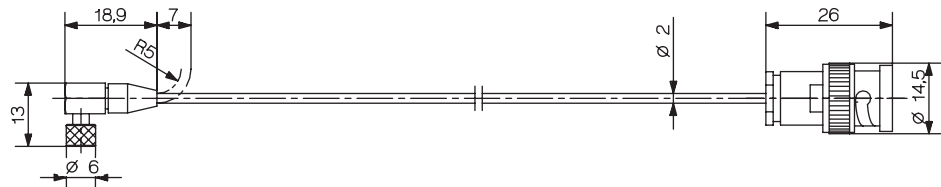
Length (m) 5/sp ($L_{\min} = 0,3$ m/ $L_{\max} = 5$ m)
 Temperature range $-55 \dots 200$ °C



Cable plug KIAG 10-32 neg. Cable PFA green \varnothing 2 mm KIAG 10-32 pos.
 Degree of protection (EN60529) IP65 IP65

Type 1641A... Connecting Cable for Sensors with KIAG 10-32 neg. Connector

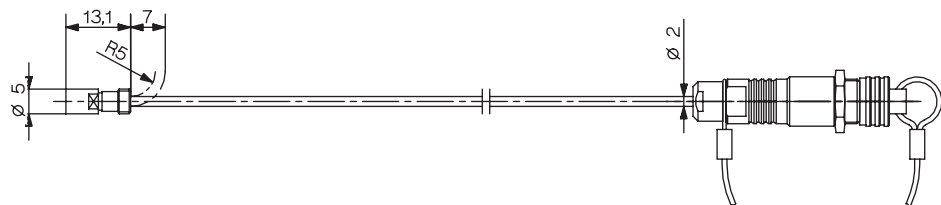
Length (m) 0,5/1/2/5/sp ($L_{\min} = 0,1$ m/ $L_{\max} = 50$ m)
 Temperature range $-55 \dots 200$ °C



Cable plug 10-32 UNF pos. (Microdot) Cable PFA green \varnothing 2 mm BNC pos.
 Degree of protection (EN60529) IP40 IP40

Type 1645C... Connecting Cable for Sensors with M4x0,35 neg. Connector, Connector with M5 Pull-Out Thread

Length (m) 0,2/0,4/0,6/0,8/sp ($L_{\min} = 0,1$ m/ $L_{\max} = 5$ m)
 Temperature range $-55 \dots 200$ °C



Cable plug M4x0,35 pos. int. Cable PFA green \varnothing 2 mm Fischer Coax neg. KE 102A014-14
 Degree of protection (EN60529) IP65 IP65

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Type 1937A... Connecting and Test Cable, Mini Coax

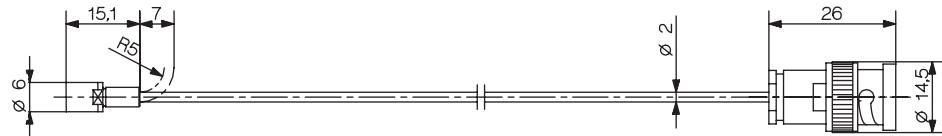
Length (m) 1/sp ($L_{\min} = 0,1 \text{ m}/L_{\max} = 10 \text{ m}$)
 Temperature range $-55 \dots 200 \text{ }^\circ\text{C}$



Cable plug Mini-Coax pos. Cable PFA green $\varnothing 2 \text{ mm}$ BNC pos.
 Degree of protection (EN60529) IP40 IP40

Type 1939A... Connecting Cable for Sensors with KIAG 10-32 neg. Connector

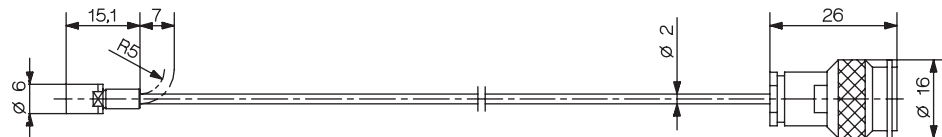
Length (m) 1/2/3/sp ($L_{\min} = 0,1 \text{ m}/L_{\max} = 20 \text{ m}$)
 Temperature range $-55 \dots 200 \text{ }^\circ\text{C}$



Cable plug KIAG 10-32 pos. int. Cable PFA green $\varnothing 2 \text{ mm}$ BNC pos.
 Degree of protection (EN60529) IP65 IP40

Type 1941A... Connecting Cable for Sensors with KIAG 10-32 neg. Connector

Length (m) 1/2/3/sp ($L_{\min} = 0,1 \text{ m}/L_{\max} = 20 \text{ m}$)
 Temperature range $-55 \dots 200 \text{ }^\circ\text{C}$



Cable plug KIAG 10-32 pos. int. Cable PFA green $\varnothing 2 \text{ mm}$ TNC pos.
 Degree of protection (EN60529) IP65 IP65

Type 1943A... Connecting Cable for Sensors with KIAG 10-32 neg. Connector

Length (m) 1/2/3/sp ($L_{\min} = 0,1 \text{ m}/L_{\max} = 10 \text{ m}$)
 Temperature range $-55 \dots 200 \text{ }^\circ\text{C}$



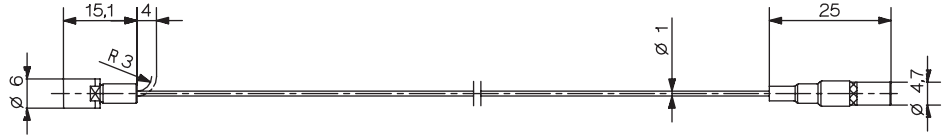
Cable plug KIAG 10-32 pos. int. Cable PFA green $\varnothing 2 \text{ mm}$ Mini-Coax neg.
 Degree of protection (EN60529) IP65 IP40

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Type 1945A... **Connecting Cable for Sensors with KIAG 10-32 neg. Connector**

The fact that this cable is very thin makes it highly suitable for use in molds.

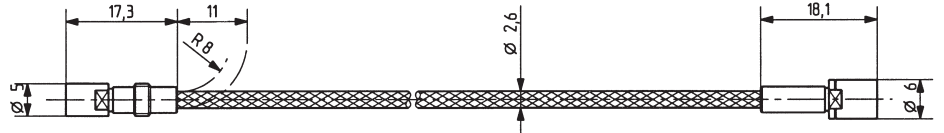
Length (m) 1/2/sp ($L_{min} = 0,1 \text{ m} / L_{max} = 5 \text{ m}$)
 Temperature range $-55 \dots 200 \text{ }^\circ\text{C}$



Cable plug KIAG 10-32 pos. int. Cable PFA blue $\varnothing 1 \text{ mm}$ Mini-Coax neg. IP40
 Degree of protection (EN60529) IP65

Type 1951A... **High Temperature Connecting Cable for Sensors with M4x0,35 neg. Connector**

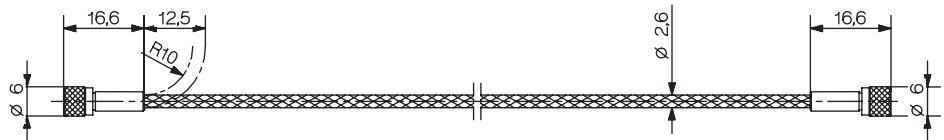
Length (m) 0,4/sp ($L_{min} = 0,1 \text{ m} / L_{max} = 5 \text{ m}$)
 Temperature range $-55 \dots 300 \text{ }^\circ\text{C}$



Cable plug M4x0,35 pos. int. Cable Kapton® with stainless steel sheathed $\varnothing 2,6 \text{ mm}$ KIAG 10-32 pos. int. IP65
 Degree of protection (EN60529) IP65

Type 1957A... **Connecting Cable for Sensors with KIAG 10-32 neg. Connector**

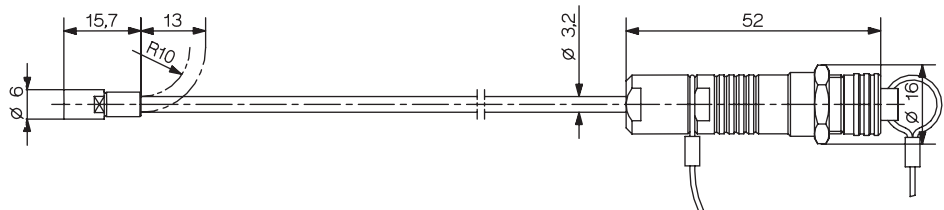
Length (m) 1/sp ($L_{min} = 0,1 \text{ m} / L_{max} = 10 \text{ m}$)
 Temperature range $-55 \dots 200 \text{ }^\circ\text{C}$



Cable plug KIAG 10-32 pos. Cable PFA green with stainless steel sheathed $\varnothing 2,6 \text{ mm}$ KIAG 10-32 pos. IP65
 Degree of protection (EN60529) IP65

Type 1979A... **Connecting Cable for Sensors with KIAG 10-32 neg. Connector, incl. Clamping Angle for Cable Coupling**

Length (m) 1/sp ($L_{min} = 0,1 \text{ m} / L_{max} = 20 \text{ m}$)
 Temperature range $-55 \dots 200 \text{ }^\circ\text{C}$

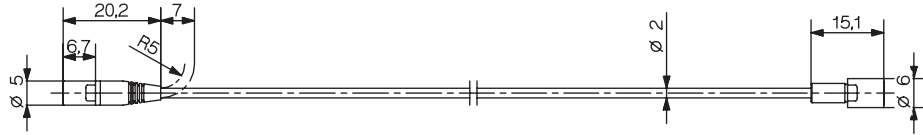


Cable plug KIAG 10-32 pos. int. Cable Viton® $\varnothing 3,2 \text{ mm}$ Fischer Triax neg. KE 103A015-12 IP65
 Degree of protection (EN60529) IP65

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Type 1983AB... **Connecting Cable for Sensors with M4x0,35 neg. Connector**
 With protective cap vulcanized to the cable at the sensor end. Welding the connection provides a permanent seal. Suitable for use in the vicinity of oils, emulsions, cooling lubricants, etc.

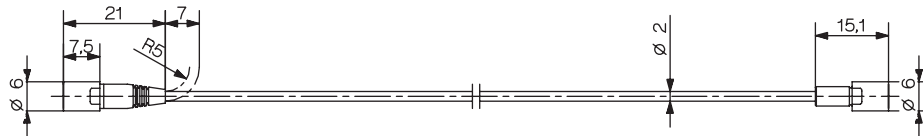
Length (m) 0,5/1/1,5/2/3/5
 Temperature range -55 ... 200 °C



Cable plug	M4x0,35 pos. int.	Cable Viton® ø 2 mm	KIAG 10-32 pos. int.
Degree of protection (EN60529)	IP65 connection screwed IP67 connection welded		IP65

Type 1983AC... **Connecting Cable for Sensors with KIAG 10-32 neg. Connector**
 With protective cap vulcanized to the cable at the sensor end. Welding the connection provides a permanent seal. Suitable for use in the vicinity of oils, emulsions, cooling lubricants, etc.

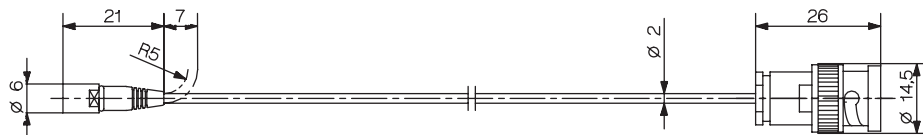
Length (m) 0,5/1/1,5/2/3
 Temperature range -55 ... 200 °C



Cable plug	KIAG 10-32 pos. int.	Cable Viton® ø 2 mm	KIAG 10-32 pos. int.
Degree of protection (EN60529)	IP65 connection screwed IP67 connection welded		IP65

Type 1983AD... **Connecting Cable for Sensors with KIAG 10-32 neg. Connector**
 With protective cap vulcanized to the cable at the sensor end. Welding the connection provides a permanent seal. Suitable for use in the vicinity of oils, emulsions, cooling lubricants, etc.

Length (m) 2/5/sp (L_{min} = 0,1 m/L_{max} = 5 m)
 Temperature range -55 ... 200 °C



Cable plug	KIAG 10-32 pos. int.	Cable Viton® ø 2 mm	BNC pos.
Degree of protection (EN60529)	IP65 connection screwed IP67 connection welded		IP40

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Cable Koaxial Technical Data

PFA blue **ø 1,0 mm**
 Temperature range -55 ... 200 °C
 Capacitance 94 pF/m
 Min. bending radius 3 mm



Construction Silver-plated copper alloy center conductor (1), PTFE dielectric (2) with semiconducting coating (3), silver-plated copper wire braid (4) and blue PFA sheath (5).

PFA green **ø 2,0 mm**
 Temperature range -55 ... 200 °C
 Capacitance 96 pF/m
 Min. bending radius 5 mm



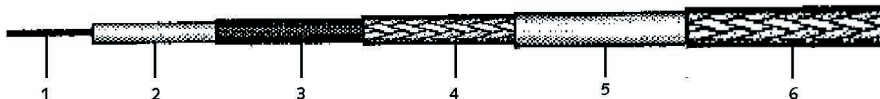
Construction Copper- and silver-plated steel wire center conductor (1), PTFE dielectric (2) with semiconducting coating (3), silver-plated copper wire braid (4) and extruded green PFA sheath (5).

PFA green **with Stainless Steel Sheathing, ø 2,6 mm**
 Temperature range -55 ... 200 °C
 Capacitance 100 pF/m
 Min. bending radius 10 mm



Construction Copper- and silver-plated steel wire center conductor (1), PTFE dielectric (2) with semiconducting coating (3), silver-plated copper wire braid (4) and extruded green PFA sheath with stainless steel outer sheath (6).

Kapton® **with Stainless Steel Sheathing, ø 2,6 mm**
 Temperature range -55 ... 300 °C
 Capacitance 105 pF/m
 Min. bending radius 10 mm



Construction Nickel-plated copper wire center conductor (1), PI dielectric (2) wrapped with semiconducting tape (3), nickel-plated copper braid (4) and PI sheath (5) with stainless steel outer sheath (6).

Cable Koaxial Technical Data

Viton®	ø 2,0 mm
Temperature range	-90 ... 200 °C (Value of Viton® 3,2)
Capacitance	107 pF/m
Min. bending radius	5 mm



Construction Silver-plated steel wire center conductor (1), extruded PTFE dielectric (2) with semiconducting coating (3), silver-plated copper wire braid (4) and oil-resistant FPM sheath (5).

Viton®	ø 3,2 mm
Temperature range	-90 ... 200 °C
Capacitance	100 pF/m
Min. bending radius	10 mm



Construction Silver-plated steel wire center conductor (1), extruded PTFE dielectric (2) with semiconducting coating (3), silver-plated copper wire braid (4) and oil-resistant FPM sheath (5).

PVC black	ø 3,2 mm
Temperature range	-25 ... 70 °C
Capacitance	100 pF/m
Min. bending radius	10 mm



Construction Bare copper wire center conductor (1), polyethylene dielectric (2), PVC semiconductor (3), bare copper wire braid (4) and black PVC sheath (5).

Acronyms

FPM	Fluoroelastomer (Viton®)
PFA	Perfluoroalkoxy copolymer
PI	Polyimide (Kapton®)
PTFE	Polytetrafluoroethylene
PVC	Polyvinyl chloride

Viton® is a registered Trademark of DuPont Performance Elastomers.
Kapton® is a registered Trademark of DuPont.

General Notes

Insulation Resistance During final inspection all cables and lengths are tested to ensure their insulation resistance exceeds $\geq 10^{14} \Omega$.

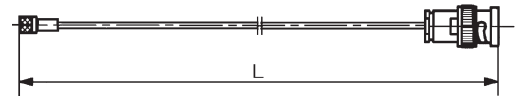
Protective Caps All connectors are supplied with protective caps to prevent ingress of moisture and dirt. It is advisable to always replace the cap when the cable is not in use.

Degree of Protection The IP degree of protection to EN60529 is tested with water. As oils, emulsions, cooling lubricants, etc, usually have a higher wetting and penetration capability, the degree of protection in contact with such fluids must be classified as being correspondingly lower.

Bending Radius The smallest permissible bending radius of coaxial cables depends on the application. The specified value relates to the connecting cable for a firmly mounted sensor being bent once only. For repeated bending the values must be at least doubled, and for flexible use and/or low-temperature applications trebled or more.

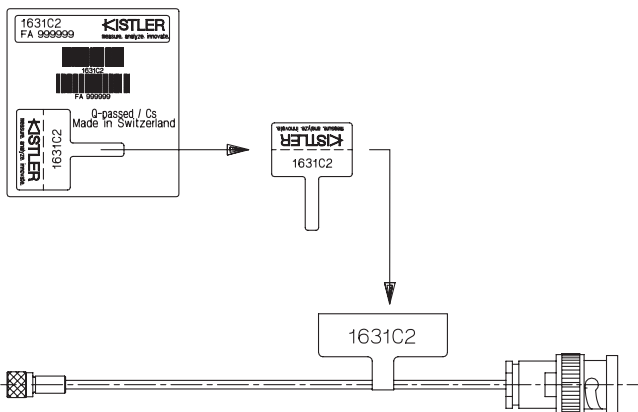
Length Tolerance

Cable length L (m)	Tolerance +.../-0 mm
<0,5	10
>0,5 ... 1,0	20
>1,0 ... 5,0	50
>5,0 ... 10,0	100
>10,0 ... 20,0	150
>20,0 ... 30,0	200
>30,0 ... 50,0	500
>50,0 ... 75,0	750
>75,0 ... 100,0	1-000



Marking

The type number and the length of the cable are specified on the pack. The detachable part of the label can be folded and used to mark the cable.



Ordering Key

Example

1631C2
1957Asp

Type

Length

L = x m (Standard)	x
L = sp (specify special length in order)	sp

The standard lengths of a particular type available and the range of possible special lengths are listed in the relevant section.

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Type

KISTLER HAS THE PERFECT CABLE CONNECTION

Kistler's premium cables/connectors are rugged, dependable and assure precision sensor measurements. Kistler connectors are high quality stainless steel. Noise and intermittent operation are eliminated because there is no plating to wear off. Stainless steel also reduces the weight by 50% compared to conventional connectors, therefore, reducing mass loading on accelerometers. O-rings at each end seal out moisture and contaminants. A built-in strain relief replaces shrink tubing, providing a reduced radius. Unlike conven-

tional cables only low-noise, extruded Teflon cable is used for a true water-tight cable seal and it will not fray during normal use. These cables can be used with both low and high impedance sensors and have a temperature range of -295°F (-195°C) to 460°F (240°C). For severe environments or permanent installations a slightly larger industrial version is available. You may save money when you use Kistler's Perfect Cable Connection because you minimize down time and lost data caused by failure of economy cables.

The Perfect Cable Connection offers you:

- All stainless steel construction
- Extruded, water tight cable jacket
- Half the weight on conventional cables
- Built-in strain relief-reduced loop radius
- Safety wire holes
- Weldable version

Uses Less Space

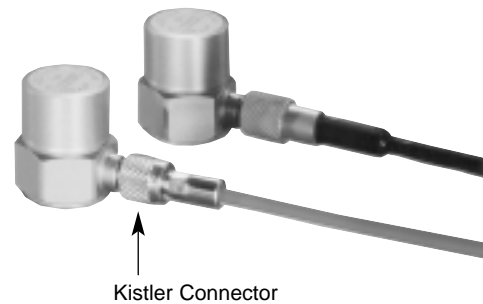
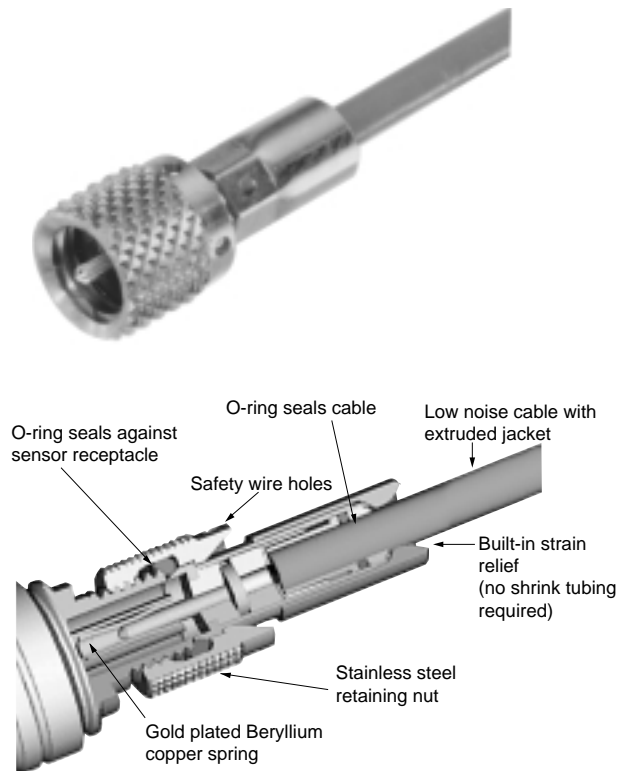


The figure to the left compares Kistler premium cables with conventional 10-32 cables and connectors. Because the cable strain relief is built-in to the connector, the cable loop requires less than half the space needed by conventional cables. Built-in strain relief offers another advantage when making acceleration measurements since troublesome cable whip is greatly reduced.

Industrial Version



The model 1939Asp... is designed for industrial uses or in areas where permanent installation is desired. Two flat areas are provided on the connector to tighten with a wrench. The connector can be welded to the sensor to ensure a permanent connection. Should a welded cable need replacement Kistler can replace the cable and connector.



Ordering Information

Model	Description
1631C...	knurled 10-32 to BNC
1635C...	knurled 10-32 to 10-32
1939A...	weldable 10-32 with flats to BNC other configurations available

Specify lengths up to 30 meters. Cable capacitance, 30pF/ft.

Kistler Instrument Corporation reserves the right to discontinue or change specifications, designs or materials without notice consistent with sound engineering principles and quality practices.

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