

Lead Extensions

for Cryogenic Temperature Sensors

Product features

Standard options:

-QL (2 m 32 AWG Quad-Lead™) and
-QT (2 m 36 AWG Quad-Twist™)

Wire types:

Quad-Lead™, Quad-Twist™, manganin,
non-magnetic, Duo-Lead™, and Duo-Twist™

Wiring configurations:

4-lead or 2-lead

Product overview

Two standard lead extension options, -QL and -QT, are available that will cover most common lead extension needs. Custom options and lengths are also available if your application requires more specialized extensions. Some configurations may be limited by material or temperature limits. Please contact us if you have questions about the lead extensions or how to implement your experimental wiring.

Lead extension summary

Wire type	Wire material	Lead number	Insulation	Durability	Maximum temperature ¹	AWG	Length	Can specify >450 K use
QL Quad-Lead™	PhBr	4-wire	Polyimide + Bond 999	Durable ribbon cable	433 K	32	2 m, 5 m, or custom length	No
						36	2 m, 5 m, or custom length	No
QT Quad-Twist™	PhBr	4-wire	Polyimide	Rugged, medium wire flexibility	500 K	32	2 m, 5 m, or custom length	Yes (-H)
			Formvar	Rugged, high wire flexibility	378 K	36	2 m, 5 m, or custom length	No
MW Manganin wire	Manganin	4-wire	Formvar	Low wire flexibility	378 K	30	2 m, 5 m, or custom length	No
						32	2 m, 5 m, or custom length	No
						36	2 m, 5 m, or custom length	No
NM Non-magnetic wire	PhBr	4-wire	Polyimide	Rugged, medium wire flexibility	500 K	32	2 m, 5 m, or custom length	Yes (-H)
			Formvar	Rugged, high wire flexibility	378 K	36	2 m, 5 m, or custom length	No
DL Duo-Lead™	PhBr	2-wire	Polyimide + Bond 999	Durable ribbon cable	433 K	36	2 m, 5 m, or custom length	No
DT Duo-Twist™	PhBr	2-wire	Polyimide	Rugged, medium wire flexibility	500 K	32	2 m, 5 m, or custom length	Yes (-H)
						36	2 m, 5 m, or custom length	Yes (-H)
DM Manganin wire	Manganin	2-wire	Formvar	Low wire flexibility	378 K	30	2 m, 5 m, or custom length	No
						32	2 m, 5 m, or custom length	No
						36	2 m, 5 m, or custom length	No
DN Non-magnetic wire	PhBr	2-wire	Polyimide	Rugged, medium wire flexibility	500 K	32	2 m, 5 m, or custom length	Yes (-H)
			Formvar	Rugged, high wire flexibility	378 K	36	2 m, 5 m, or custom length	No
				Delicate, high wire flexibility		42 ²	2 m, 5 m, or custom length	No

¹ Standard leads are attached with 63/37 SnPb solder, intended for use below 450 K. If the sensor is to be used between 450 K and 500 K, higher temperature 90/10 PbSn solder is required. All lead extension soldering is performed to J-STD-001 Class 2 quality standard.

² Phosphor-bronze has comparable thermal conductivity levels to manganin when 42 AWG is used. Note this ultra-thin version is extremely delicate and recommended only for experienced users.

Recommended configurations

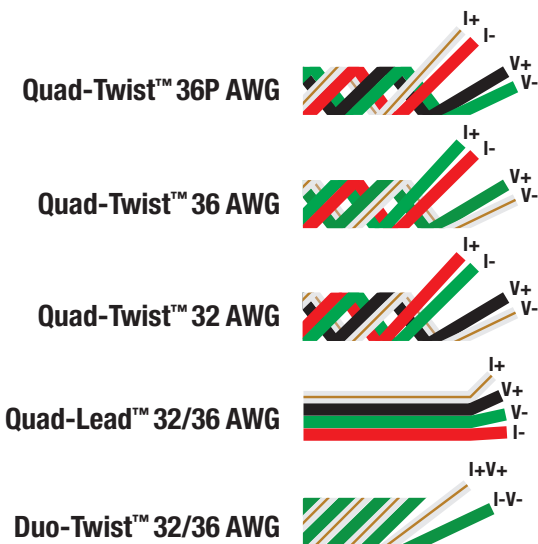
Part number	Application	Configuration	Wire type	Insulation	Gauge
-QL	Situations where ease-of-use and ruggedness is important	QL (Quad-Lead)	PhBr	Polyimide	32 AWG
		Wire is easy to heat sink due to its ribbon structure	Rugged and flexible	Strong, solvent-resistant, high temperature rating	Easier to prepare and solder than thinner gauges
-QT	Noisy environments where signal integrity must be protected	QT (Quad-Twist)	PhBr	Formvar	36 AWG
		Helps reject electromagnetic interference (slightly more difficult to heat sink)	Rugged and flexible	Abrasion resistant, wire flexibility (not solvent resistant)	Reduces thermal conductivity and heat leak

Wire material

Phosphor-bronze is the most common cryogenic wire, offering low thermal conductivity, moderate resistance, and excellent magnetic field stability—ideal for magnet environments and multi-lead setups. It's rugged and flexible, especially in twisted or ribbon formats. Manganin provides lower thermal conductivity and copper-matched thermal expansion, making it suitable for applications with thermal cycling, but it's less flexible due to its insulation and single-strand form.

Property	Phosphor-bronze (PhBr)	Manganin
Best use case	General-purpose cryogenic wiring, especially in magnetic fields and multi-lead setups	Precision applications needing copper-matched expansion and minimal heat leak
Durability and handling	Rugged and flexible	Less flexible
Thermal conductivity	Low ³	Very low — minimal heat leak
Electrical resistance	Moderate – less signal noise	High
Magnetoresistance	Very low – best for magnetic fields	Low
Magnetic properties	Non-ferromagnetic	Non-ferromagnetic
Maximum temperature	500 K	378 K
Available wire gauges (AWG)	32, 36, 42	30, 32, 36
Thermal expansion	Not closely matched to copper	Very close to copper—reduces mechanical stress in thermal cycling

³ Phosphor-bronze has comparable thermal conductivity levels to manganin when 42 AWG is used. Note this ultra-thin version is extremely delicate and recommended only for experienced users.



Wire gauge

The wire gauge selection process usually involves a compromise between thermal conductivity and ease-of-use, with thinner wire being preferred to reduce thermal conductivity and thicker wire being easier to handle and work with. 32 and 36 AWG are our preferred wire gauges to use because they provide the best balance between reduced thermal conductivity and ease-of-use.

AWG	Diameter	Material	Recommendation
30	0.01 in (0.255 mm)	Manganin	Only use when required
32	0.00795 in (0.202 mm)	PhBr, manganin	Recommended
36	0.0055 in (0.127 mm)	PhBr, manganin	Recommended
42	0.0025 in (0.0635 mm)	PhBr	Only use when required

Wire insulation

Polyimide is the most versatile cryogenic wire insulation, offering high thermal and radiation resistance, excellent chemical durability, and rugged mechanical performance—ideal for harsh environments like space or high-energy labs. Formvar® is highly flexible and abrasion-resistant, making it great for tight bends at ultra-low temperatures, though it's sensitive to solvents and requires careful handling; it should be given an annealing preheat prior to varnish application. Polyimide with Bond 999 builds on standard polyimide's strengths with enhanced bonding properties, ideal for applications needing strong mechanical adhesion or thermal bonding. Both polyimide and Formvar can be removed mechanically during terminal preparation.

Property	Polyimide	Formvar® (polyvinyl formal)
Best use case	Most versatile; widely used	Ideal for tight bends at cryogenic temperatures
Chemical resistance	Excellent — resists solvents and burnout	Poor — crazes with solvents like toluene, xylol, and naphtha
Radiation resistance	Excellent	Not rated for radiation
Mechanical properties	Rugged	Flexible and abrasion-resistant
Voltage rating (32/36 AWG)	3525/2525 VAC	3525/2525 VAC

Ordering information

-XX Wire type	-YY Wire gauge	-Z Length (m)	-H >450 K	Ordering part number
QL Quad-Lead™	32	2 m	—	Recommended (-QL)
		5 m		-QL-32-5
		Custom		-QL-32-Z
	36	2 m	—	-QL-36-2
		5 m		-QL-36-5
		Custom		-QL-36-Z
QT Quad-Twist™	32	2 m	-H	-QT-32-2(-H)
		5 m		-QT-32-5(-H)
		Custom		-QT-32-Z(-H)
	36	2 m	—	Recommended (-QT)
		5 m		-QT-36-5
		Custom		-QT-36-Z
MW Manganin wire	30	2 m	—	-MW-30-2
		5 m		-MW-30-5
		Custom		-MW-30-Z
	32	2 m	—	-MW-32-2
		5 m		-MW-32-5
		Custom		-MW-32-Z
NM Non-magnetic wire	32	2 m	-H	-NM-32-2(-H)
		5 m		-NM-32-5(-H)
		Custom		-NM-32-Z(-H)
	36	2 m	—	-NM-36-2
		5 m		-NM-36-5
		Custom		-NM-36-Z
DL Duo-Lead™	36	2 m	—	-DL-36-2
		5 m		-DL-36-5
		Custom		-DL-36-Z
DT Duo-Twist™	32	2 m	-H	-DT-32-2(-H)
		5 m		-DT-32-5(-H)
		Custom		-DT-32-Z(-H)
	36	2 m	-H	-DT-36-2(-H)
		5 m		-DT-36-5(-H)
		Custom		-DT-36-Z(-H)
DM Manganin wire	30	2 m	—	-DM-30-2
		5 m		-DM-30-5
		Custom		-DM-30-Z
	32	2 m	—	-DM-32-2
		5 m		-DM-32-5
		Custom		-DM-32-Z
DN Non-magnetic wire	32	2 m	-H	-DN-32-2(-H)
		5 m		-DN-32-5(-H)
		Custom		-DN-32-Z(-H)
	36	2 m	—	-DN-36-2
		5 m		-DN-36-5
		Custom		-DN-36-Z
	42	2 m	—	-DN-42-2
		5 m		-DN-42-5
		Custom		-DN-42-Z

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