smiths interconnect

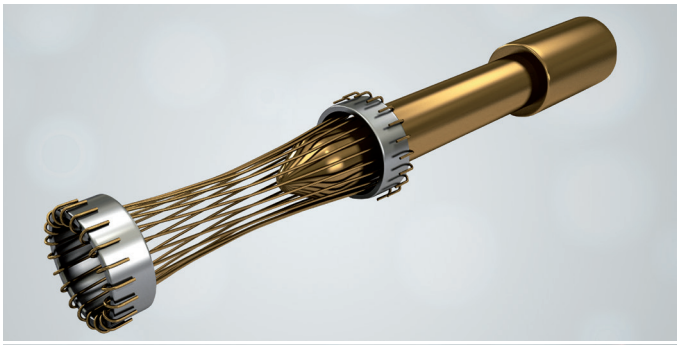
HyperGrip® Series

High Reliability Medical Circular Connectors

Available Contact Technologies

Features and Benefits

Hypertac® Hyperboloid - HC



- **Long contact life**

  Industry-leading mating cycles (over 20,000) provide low cost of ownership
- **Low insertion/extraction forces**

  Ergonomic mating without cost and size of mate assist hardware
- **Lower contact resistance**

  Low power consumption / lower voltage drop across connector
- **Higher current ratings**

  Smaller contacts needed to carry power for reduced size and weight
- **Immunity to shock and vibration**

  Reliability under harsh environmental conditions
- **360° contact wipe**

  Self-cleaning contacts assure uninterrupted connection
- **RoHS compliance**

Screw-machined contact - MR

- **Medium contact life**

  Mechanical life minimum 2,000 cycles
- **Flexible design**

  The inner clip and the socket body are manufactured and plated separately
- **Reliable and cost effective**

  The production of machined specific contact bodies allows for high volumes and low costs
- **Low insertion/extraction forces**

  Ergonomic mating without cost and size of mate assist hardware
- **Low contact resistance**

  Low power consumption / lower voltage drop across connector
- **Higher current ratings**

  Small contacts needed to carry power for reduced size and weight
- **RoHS compliance**

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HyperGrip® Series

Designed to meet medical industry requirements

HyperGrip Circular Connector Series is available with 12, 19, or 33 pin positions and a user-configurable keying system. While competitive products require purchasing a different connector for each keying configuration needed, our advanced keying system allows customers to build connectors with six different keying options reducing lead time and inventory.

Specifically designed to meet medical industry requirements, the HyperGrip connector's sleek, robust body delivers superior performance in the most crucial applications. Not only does the standard sealing offer IP65 protection when mated to prevent electrical shorts, but the available shielding feature supplies EMI/RFI protection providing the highest degree of safety and reliability.

By utilizing the unparalleled performance of Hypertac® hyperboloid contact technology and the flexible and reliable design of the MR contact, HyperGrip connectors are able to provide high cycle life, low power consumption, low insertion force, reliability under harsh conditions, maximum contact performance and excellent wiping action.

HyperGrip connectors are color-coded and range from ~12.5 to 22.5 mm in diameter. The five available color options, along with our innovative keying system, make recognition effortless and incorrect mating impossible. This becomes essential for medical instrumentation applications where multiple connector interfaces are required. The Series includes disposable plugs for HG2 and HG4 sizes designed to support overmolding and high volume production methods and to withstand at least 30 cycles whilst ensuring the connector performance in terms of insulation resistance, dielectric withstanding voltage, current carrying, and low level current resistance.

Smiths Interconnect offers custom options in order to meet application specific requirements. The flexible design of HyperGrip connectors allows for the use of alternate technologies including fiber optic (expanded beam or butt joint termini), coaxial and spring probe contacts. Custom inserts, cable mount receptacles and cable assemblies (available in select sizes) can also be provided to optimize your connector solution.

Features and Benefits

- **Push/pull latching feature, quick connect**
  Simple one-hand mating/unmating
- **Innovative customer keyability**
  Easily keyed in 6 standard positions to prevent mismating
- **Available with 5 color code options**
  Visually intuitive mating
- **Sleek, robust body**
  Designed to aesthetically complement medical devices
- **Sealing to IP65 when mated**
  Meets or exceeds typical medical sealing requirements
- **Fingerproof**
  Meets requirements of IEC 60601-1 specifications
- **Multiple contact technologies available**
  Flexibility for superior performance in high reliability, high speed, high density, high frequency and/or hybrid solutions
- **Shielding option available in HG2, HG3 and HG4**
  Protection against EMI/RFI interference
- **Disposable option for HG2 and HG4**
  Single use disposable plugs and receptacles designed to support overmolding / high volume production methods and to withstand at least 30 cycles
- **Autoclave, EtO and Sterrad® sterilizable**
  Meets typical medical sterilization requirements
- **UL94 flammability rated materials**
  Meets medical industry safety requirements
- **Integrated strain relief**
  Prevents cable wire fatigue due to bending
- **Contacts shipped unloaded**
  Easier termination for reduced cost of ownership: crimp and poke termination eliminates the need to pre-tin, solder, and shrink boot

How To Order

1	2	3	4	5	6	7	8	9	10	11	12	13
HG					G					R		

1	Series	HG Series
2	Size	2 HG2 · 3 HG3 · 4 HG4
3	Type	P Plug · E Receptacle/Panel · C Receptacle/Cable (Available on HG2 only)
		D Disposable plug (HG2 and HG4 only) · S Disposable receptacle (HG2 and HG4 only)
4	Connector option	1 Sealed · 2 Shielded (Unsealed) HG2, HG3, HG4 only / plugs "P" and panel receptacles "E" only)
5	Strain relief size (Cable diameter ranges)	0 No strain relief (All HG receptacles, or Plugs without strain relief) · 5 7.00 mm to 9.00 mm (HG3 plug only)
		4 4.50 mm to 6.50 mm (HG2 plug only) · 6 9.00 mm to 11.00 mm (HG4 plug only) (Shielded: 9.50 mm to 11.00 mm)
6	Outer shell color (Fixed)	G Light gray · W White (Disposable only)
7	Color coding (Applied to strain relief or panel seal only)	G Light gray (Standard) · B Black · D Blue · R Red · V Green · Y Yellow · N None (Plug only)
8	Positions	12 HG2 · 19 HG3 · 33 HG4
9	Contact diameter	04 0.4 mm (HG2, HG3, HG4)
10	Contact gender	F Female HC sockets (Reusable Receptacles only) · M Male pins (Plugs only) · C MR contact female sockets (Reusable and Disposable Receptacles only)
11	Termination (Fixed)	R Crimp/Solder (26–28 AWG**) (Contacts are shipped unloaded, may be crimped or soldered, then inserted into insulator. For more information, please see Assembly Instructions.)
12	Plating (Pins: Gold over nickel Sockets: Gold over nickel on contact surfaces, gold flash on terminations)	G HG2, HG3, HG4 pins
		ANH HG2, HG3, HG4 HC sockets
		I HG2, HG3, HG4 MR sockets · A2 Disposable HG2, HG4 pins
13	Keying option (Disposable only)	-A A-Key · -B B-Key
		-C C-Key · -D D-Key
		-E E-Key · -F F-Key

Available tooling: Crimp Tool: AFM8 or M22520/2-01, Crimp Positioner: T2030 (HG2, HG3, HG4), Insertion Tool: T2080

Technical Characteristics

	HG2	HG3	HG4
Number of contacts	12	19	33
Contact diameter in inches (mm)	0.016 (0.40)	0.016 (0.40)	0.016 (0.40)

Materials

Body	Polyetherimide / Polycarbonate for Disposable plugs
Insulators	Liquid crystal polymer
Seals	Silicone

Contact Materials and Plating

	HC	MR
Sockets	Beryllium copper wires Brass body components Gold over nickel plating on mating surface Gold flash over nickel on termination	Beryllium copper clip Copper-zinc-lead body component Gold plating over Nickel underplating
Pins	Phosphor bronze Gold over nickel plated	

Terminations

Crimp (Pin and Socket)	26 to 28 AWG *Optional terminations, including solder cup and straight-dip pc tails (for panel mount receptacles), are special order only. Please contact factory for availability.*

Shielding *(Optional)*

Effectiveness	Up to 3 GHz
Attenuation	50 dB maximum at 3 GHz

Mechanical

Mating cycle life	Up to 20,000 with Hyperboloid contact - Up to 2,000 with MR contact - Disposable at least 30 cycles
Contact extraction force	0.50 to 1.60 oz. per contact

Electrical

Current rating (A) *(per contact, with all contacts energized)*	3	2,5	1
Contact resistance	Hyperboloid Contacts < 8.0 mΩ - MR Contacts and Disposable Options < 12.0 mΩ typical		
Operating voltage	250 V max.		
Dielectric withstanding voltage	750 V		
Insulation resistance	> 5×10^4 MΩ at 500 VDC		

Physical and Environmental

Operating temperature rating	–40 °C to 125 °C
Processing temperature range	Up to 185 °C
Flammability	Materials meet the requirements of UL94
Sterilization	Reusable: Steam autoclave, EtO, Sterrad®2 - Disposable: EtO
Fingerproofing	Meets IEC 60601-1 requirements
Sealing (mated condition)	Reusable IP65 - Disposable IPX4

Notes:

1) HyperGrip is patented under US patent numbers: 7,326,091B2; 7,661,995B2; D596,127S; 7,938,670; D615,932; D616,825
2) Sterrad® is a registered trademark of Advanced Sterilization Products (ASP) division of Ethicon US, LLC, a Johnson & Johnson Company. Dimensions are in inches (mm)

Dimensions

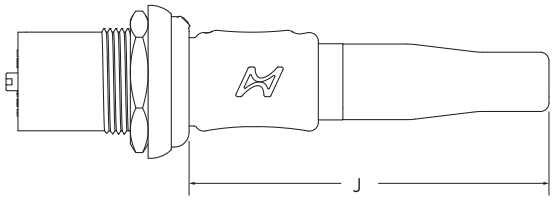
Standard HyperGrip® connectors

Plug and Receptacle

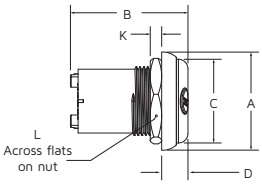
HG2, HG3 and HG4

Plug and receptacle mated pair

With strain relief

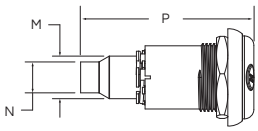


E Receptacle

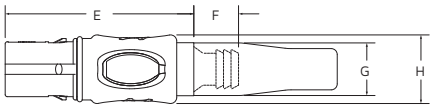


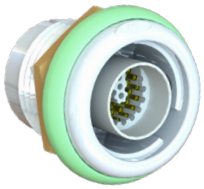
E Receptacle

With shielding option



P Plug





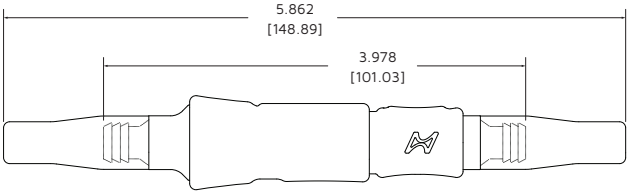
	Dimensions													
	A	B	C	D	E	F	G	H	J	K	L	M	N	P
HG2	Ø1.014 (25.76)	1.220 (30.88)	Ø0.866 (22.00)	0.272 (6.91)	1.808 (45.92)	0.427 (10.84)	Ø0.502 (12.75)	Ø0.656 (16.66)	2.390 (60.65)	0.118 (3.00)	0.823 (20.90)	Ø0.449 (11.40)	Ø0.346 (8.80)	1.704 (43.27)
HG2 Disposable	Ø1.014 (25.76)	1.129 (28.67)	Ø0.866 (22.00)	0.188 (4.77)	0.809 (20.56)	0.530 (13.46)	Ø0.583 (14.80)	Ø0.655 (16.63)	1.865 (47.38)	0.236 (6.00)	1.060 (26.90)	-	-	-
HG3	Ø1.172 (29.77)	1.220 (30.88)	Ø1.007 (25.59)	0.272 (6.91)	2.170 (55.07)	0.354 (9.00)	Ø0.650 (16.50)	Ø0.800 (20.36)	2.730 (69.33)	0.118 (3.00)	0.980 (24.90)	Ø0.535 (13.60)	Ø0.378 (9.60)	1.961 (49.82)
HG4	Ø1.250 (31.77)	1.220 (30.88)	Ø1.090 (27.80	0.272 (6.91)	2.170 (55.07)	0.354 (9.00)	Ø0.710 (18.15)	Ø0.880 (22.47)	2.730 (69.33)	0.118 (3.00)	1.060 (26.90)	Ø0.610 (15.50)	Ø0.378 (9.60)	2.124 (53.95)
HG4 Disposable	Ø1.250 (31.77)	1.157 (29.40)	Ø1.090 (27.80)	0.188 (4.77)	0.798 (20.27)	0.621 (15.78)	Ø0.815 (20.70)	Ø0.885 (22.48)	2.226 (56.55)	0.236 (6.00)	1.260 (31.90)	-	-	-

Dimensions are in inches (mm)

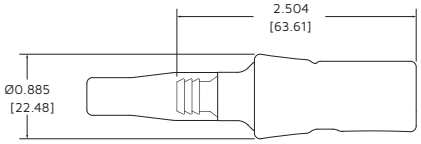
HG2 Plug and Cable Receptacle

HG2 Plug and cable receptacle mated pair

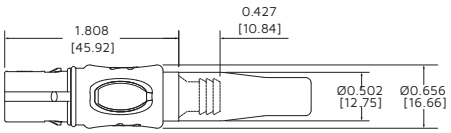
With strain relief



C HG2 cable receptacle

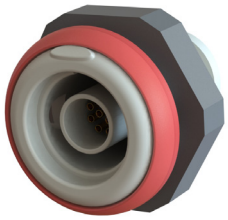


P HG2 plug



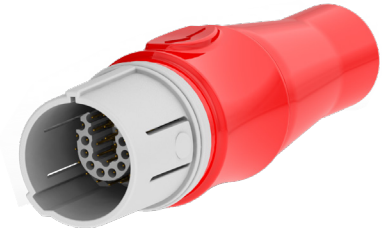
Disposable HG2 and HG4 Plugs and Receptacles

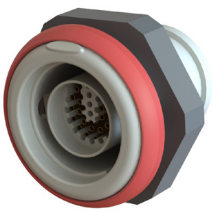
Disposable HG2 plug and receptacle



Disposable HG4 plug and receptacle

With strain relief





Keying and Mounting

(User information)

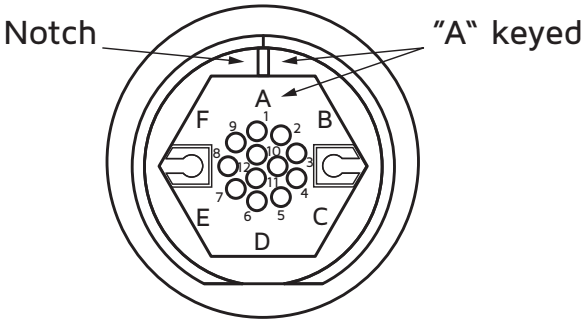
Receptacle Keying

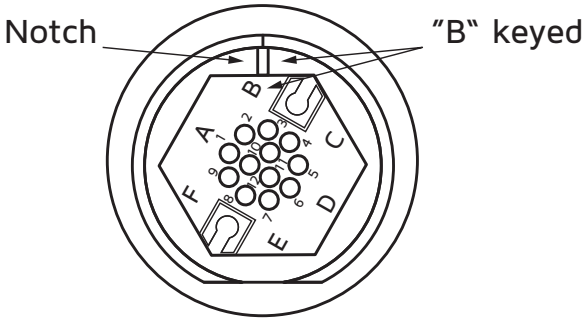
HG2 shown (HG3 and HG4 are keyed in the same fashion).

6 different keying positions are possible - A through F

Keying position A

Receptacle wiring end





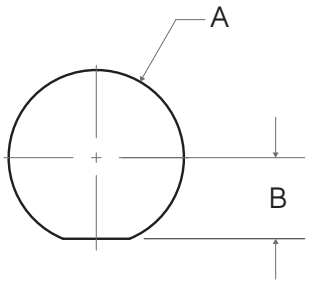
See Assembly Instructions for receptacle keying information[1]:

S50386: Panel Receptacles

S50431: Cable Receptacles

Panel Cutouts

All sizes



	A +0.002 -0.001 (+0.050 -0.030)	B ±0.001 (±0.030)
HG2	Ø0.711 (18.06)	0.329 (8.36)
HG2 Disposable	Ø0.791 (20.1)	0.307 (7.80)
HG3	Ø0.870 (22.10)	0.393 (9.98)
HG4	Ø0.949 (24.10)	0.430 (10.92)
HG4 Disposable	Ø0.988 (25.1)	0.425 (10.8)

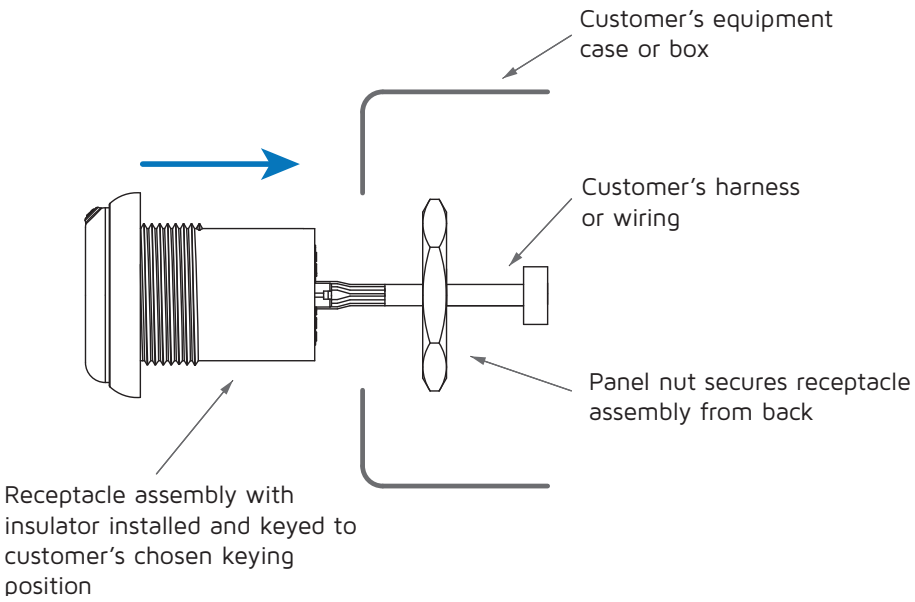
Dimensions are inches (mm)

Notes:

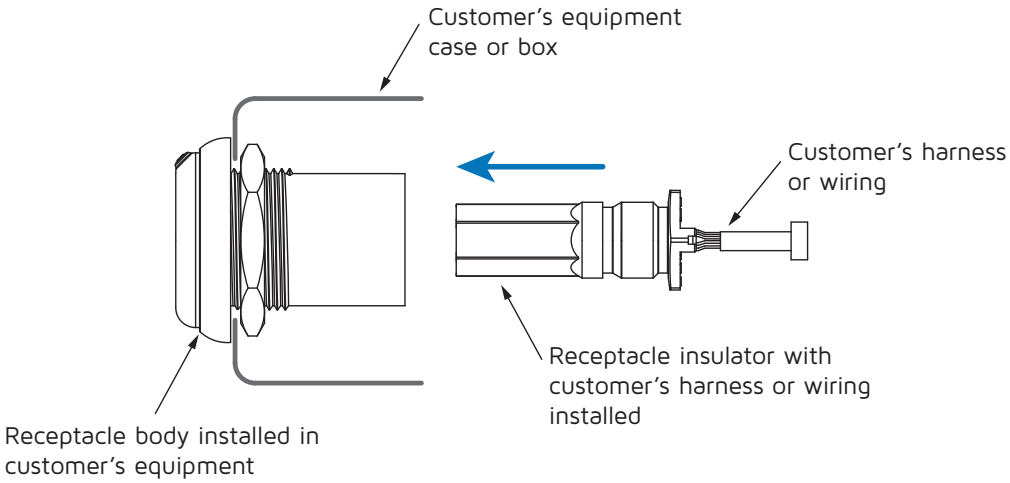
1) Instructions also include plug keying information: S50387

Receptacle Mounting Options

1 Assemble outside panel then install



2 Install receptacle body then assemble inside panel



Notes:

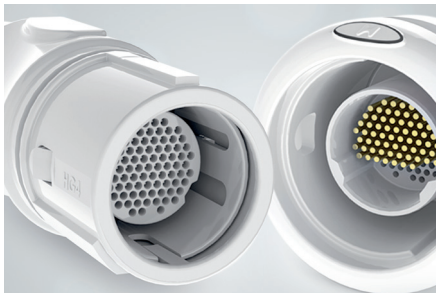
Recommended tightening torque for panel mount receptacle for HG2, HG3, and HG4 is 0.452 Nm to 0.678 Nm.
The recommended tightening torque for HG0 is 0.226 Nm to 0.339 Nm.

Additional Contact Technologies*

(Features and Benefits)

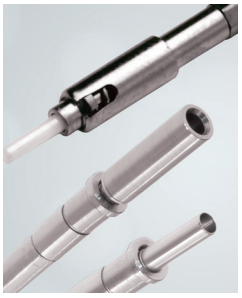
Spring Probe

- Extremely high density
- Shock and vibration resistant
- Exceptional misalignment tolerance
- High cycle life
- Z-axis compliance



Fiber Optic

- Two standard types:
  - **Size 16 butt-joint**
  - **Size 12 expanded-beam (EB) termini**
- Low insertion loss
- Hermaphroditic contacts (butt joint)
- Multi and single-mode fiber compatible (EB)
- Low susceptibility to contamination (EB)
- Resistant to EMI/RFI and crosstalk



Coaxial

- 50Ω characteristic impedance
- Crimp termination for RG-405 Flex Cable
- Low VSWR up to 40 GHz
- Magnetic permeability: 30x10-5μr
- Immunity to shock and vibration
- Up to 20K mating cycles

Applications

Catheter

- **Disposable**
- **High density spring probe contacts**
- **High cycle life**
- **Low contact resistance**
- **Minimal insertion/ extraction forces**

Patient monitoring

- **Hyperboloid signal contacts**
- **Custom creepage and clearance**
- **High reliability**
- **Cost effective**
- **Patient friendly**

Portable therapeutic

- **Custom cable solution**
- **Superior reliability for critical application**
- **Color coded**
- **Multiple keys to prevent mismating**
- **Intuitive design**

MRI/CT scanning

- **Quick push/pull latching**
- **Hyperboloid signal contacts**
- **ESD finger-proof protection**
- **Multiple keying options**

Surgical imaging

- **Expanded beam fiber optic contact**
- **Low susceptibility to contamination**
- **Fiber optic video connection for easy mating to HD display system**

Home healthcare

- **Hyperboloid and USB signal contacts**
- **IP65 sealing**
- **Simple operation**
- **Ergonomic, ideal for in-home patient use**

* Not for disposable configurations. Please contact factory for availability

Worldwide Support

Connectors

Americas

Sales
connectors.uscsr@smithsinterconnect.com

Technical Support
connectors.ustechsupport@smithsinterconnect.com

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