

■ ELECTRONICS DIVISION

METRAL® 2mm HIGH-SPEED CONNECTORS

1000 SERIES, 2000 SERIES, 4000 SERIES

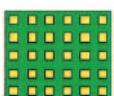
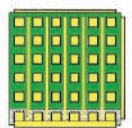

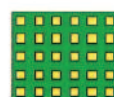
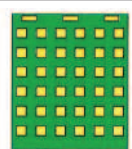
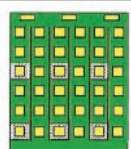
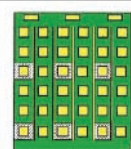
FCI: SETTING THE STANDARD FOR CONNECTORS

With operations in 30 countries, FCI is a leading manufacturer of connectors. Our 13,500 employees are committed to providing customers with high-quality, innovative products for a wide range of consumer and industrial applications.

CONTENTS

Overview of Metral® High-Speed Connectors	3
Metral 1000 Backpanel Connectors	4
Metral 2000 Backpanel Connectors	6
Metral 4000 Backpanel Connectors	8
Additional Technical Information	10

COMPARISON OF CONNECTOR STRUCTURES

	Metral® 2mm High-Speed Connectors		
Standard Metral Receptacle	1000 Series Receptacle		4000 Series Receptacle
 <ul style="list-style-type: none"> Unshielded contact array 	 <ul style="list-style-type: none"> Stripline shields between columns Outer ground shield Dedicated ground row 		 <ul style="list-style-type: none"> Stripline shields between columns Outer ground shield Dedicated ground row Optimized contact geometry for 100Ω differential impedance
Standard Metral Header	1000 Series Header	2000 Series Header	4000 Series Header
 <ul style="list-style-type: none"> Unshielded contact array 	 <ul style="list-style-type: none"> Unshielded contact array Outer ground shield 	 <ul style="list-style-type: none"> Stripline shields between columns Outer ground shield Dedicated ground rows 	 <ul style="list-style-type: none"> Stripline shields between columns Outer ground shield Dedicated ground rows Optimized contact geometry for 100Ω differential impedance



Today's communication technology requires the transmission of higher data rates, driving the need for enhanced hardware to cope with the signal integrity requirements of these systems. The system designer must balance three interacting components to optimize system performance:

- Integrated circuit chips
- Multi-layer boards
- Interconnect systems

FCI recognizes that the interconnection of complex subsystems is a crucial element in the design of communications equipment. To meet these evolving needs, FCI developed 5-row and 8-row Metral® high-speed backplane products to complement its proven standard Metral offering. The basic level of performance improvement is provided by the Metral 1000 Series, while the Metral 2000 Series and Metral 4000 Series provide capability to scale connector performance to support data rates up to 5 Gb/s. Because the three Metral high-speed series are plug-compatible, designers are able to select the appropriate combination of header and receptacle to optimize the price and performance level for their specific system design.

	1000 Series Header	2000 Series Header	4000 Series Header
1000 Series Receptacle	622 Mb/s	1.25 Gb/s	2.5 Gb/s
4000 Series Receptacle	1.25 Gb/s	2.5 Gb/s	5 Gb/s

The Metral 1000 Series and Metral 2000 Series are designed for press-fit termination into standard 0.65mm-0.85mm diameter through holes. The backplane headers are available with stub-mount tails or extended tails for mid-plane applications requiring rear plug-up capability.

The Metral 1000 Series utilizes stripline shields between the columns of signal contacts in the right-angle receptacle and outer ground shields in the vertical header. The connectors can be routed in either single-ended or differential-pair configurations and all contacts are available for use as signals.

The Metral 2000 Series employs a shielded stripline structure in both the receptacle and header. In addition to having ground shields between columns, the 5-row connectors use the third row and the 8-row connectors use the third and sixth rows for ground connections.

The Metral 4000 Series also utilizes a shielded stripline structure in both the right-angle receptacle and vertical header. In addition to having ground shields between columns, the 5-row connectors use the third row for ground connections. The Metral 4000 Series also features a modified contact geometry optimized for 100-ohm differential pairs to provide a better impedance match and lower insertion loss. This series also uses a compliant section designed for a 0.45mm-0.55mm finished hole diameter, which lowers capacitance and frees additional board space for trace routing.

All Metral high-speed products are designed in conformance with IEC-61076-4-104 and are designed to be end-to-end stackable with FCI standard Metral products. In addition, the connector system has been tested and qualified to Telcordia® GR-1217-CORE for Central Office and Uncontrolled Environment.

Telcordia® is a registered trademark of Telcordia.

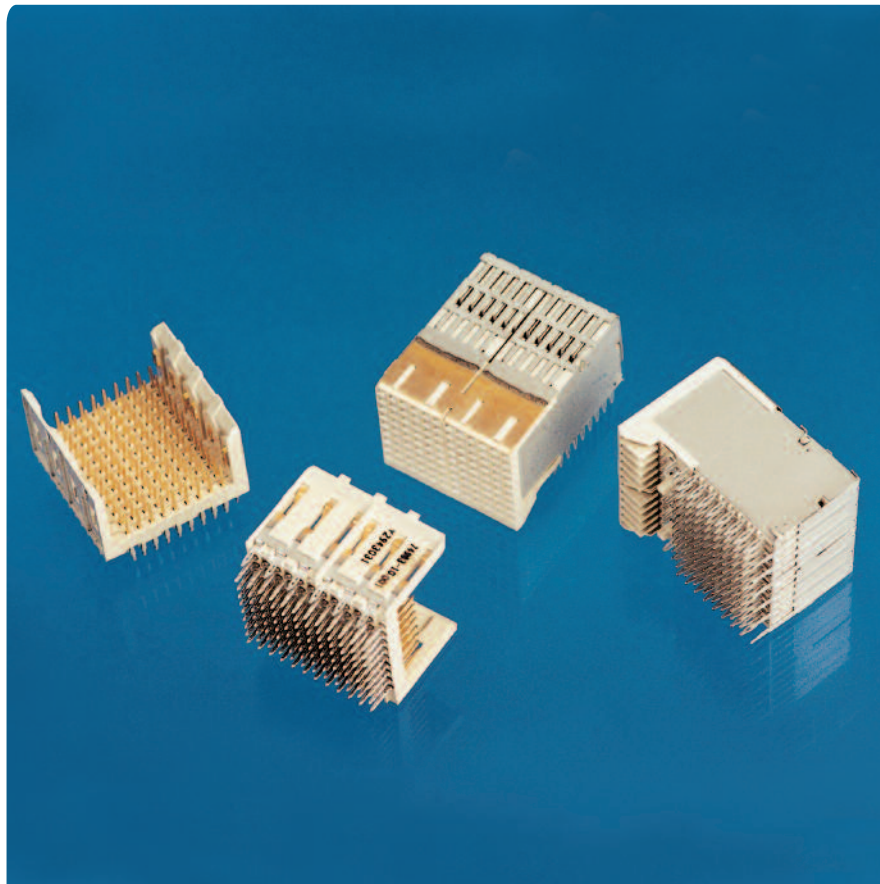
METRAL® 1000 SERIES

DESCRIPTION

FCI's Metral® 1000 Series is a high-speed 2 mm backpanel connector system consisting of right-angle receptacles and vertical headers. The 1000 Series features a unique stripline structure in the receptacle and outer ground shields in the header. Apart from these features, the connectors are similar to the FCI Standard Metral Connectors. The stripline structure allows the Metral 1000 Series to have improved signal performance when routed in either a single-ended or a differential pair configuration.

The Metral 1000 Series is available in 5x6 and 8x12 module sizes with shrouds for mid-plane applications. The system also features dedicated ground rows. Two-, three-, and four- module monoblocks for the 5-row connector are available.

Metral 1000 Series connectors are designed to conveniently stack end-to-end with other FCI Metral products.



FEATURES & BENEFITS

- Fully shielded stripline transmission structure
- Reduced crosstalk compared to the FCI Standard Metral Connector System
- Less than 5% multi-line active NEXT @ 200 ps (10-90%) rise time in differential applications
- All contacts can be used for signals since the grounds are built into the receptacle and header shield structures
- Dual-beam receptacle contacts
- 200 mating cycles
- Available in 5- and 8-row configurations
- Rear plug up options
- Stackable end-to-end with other FCI Metral products
- Capability to provide customized select-load patterns in headers
- Press-fit headers and receptacles for easy installation with standard press tooling
- Repairable
- Lead-free and RoHS-compliant versions are available

TARGET MARKETS / APPLICATIONS

- Communications
 - Transmission
 - Access
 - Switches
 - Routers
- Data
 - Servers
 - Storage Enclosures
- Industrial, Instrumentation and Medical
 - Rack-Based Systems

TECHNICAL INFORMATION

MATERIALS

- Housings: High-temperature, glass filled LCP, UL 94 V-0
- Receptacle contacts: Beryllium-copper
- Header pins: Phosphor-bronze
- Ground shields: Phosphor-bronze
- Plating:
 - Contact area: per Telcordia™ GR-1217-core for Central Office and Uncontrolled Environment
 - Press-fit tails: tin-lead or tin

MECHANICAL PERFORMANCE

- Mating force: 0.55 N max. per contact pair including ground and shield contacts
- Withdrawal force: 0.20 N min. per contact pair including ground and shield contacts
- Signal contact normal force: 0.39 N min. (EOL)

ELECTRICAL PERFORMANCE

- Operating temperature: -55°C to +105°C
- Current rating: 1 amp when all contacts are powered or 3 amps when one contact is powered at a 30°C max. temperature rise
- Contact resistance: 20 mΩ max.
- Insulation resistance: 1000 MΩ min.
- Signal integrity: Data and SPICE models are available at www.fciconnect.com/highspeed. Contact FCI for additional information.

SPECIFICATIONS

- IEC 61076-4-104
- FCI Product Specifications
 - GS-12-110 for 5-row connectors
 - GS-12-134 for 8-row connectors
- FCI Application Specifications
 - GS-20-010 for headers and shrouds
 - GS-20-017 for receptacles

APPROVALS & CERTIFICATIONS

- Recognized per UL/CSA
- Qualified per Telcordia GR-1217-CORE, Central Office (CO) and Uncontrolled Environment (UE)

PACKAGING

- Tubes

PART NUMBERS

Header	Receptacle	Shroud	Number of Rows & Positions	For Card Thickness
84817-XXX	84688-XXX	73993-XXX	5-Row 5x6	1.27 mm (0.050") - 2.54 mm (0.100")
73983-XXX	73981-XXX	73993-XXX	5-Row 5x6	1.27 mm (0.050") - 2.54 mm (0.100")
84881-XXX	84854-XXX	84882-XXX	5-Row 5x6	2.54 mm (0.100") - 3.40 mm (0.134")
74983-XXX	74981-XXX	74993-XXX	8-Row 8x12	1.27 mm (0.050") - 3.40 mm (0.134")

Note: All Dash numbers -XXX represent available options such as plating types, tail lengths for headers. Lead-free and RoHS-compliant products are designated by the addition of LF as a suffix to the dash number. For detailed product information, visit our on-line catalog at www.fciconnect.com/metral.

Use web link www.fciconnect.com/metral to obtain product drawings and additional technical information.

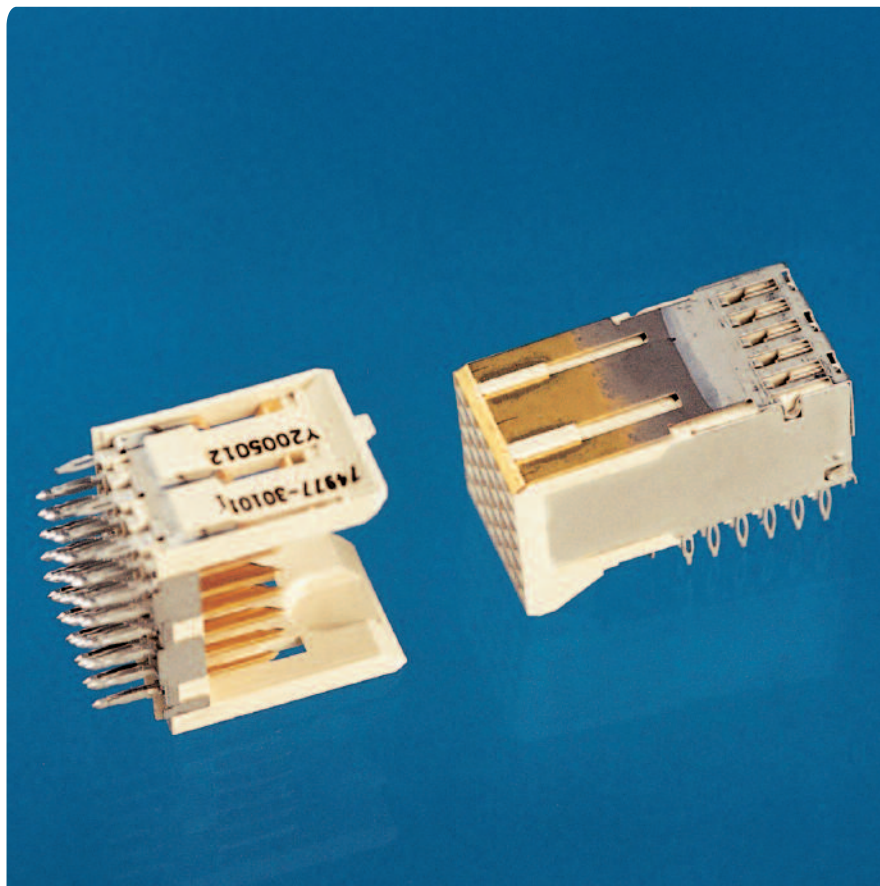
METRAL® 2000 SERIES

DESCRIPTION

FCI's Metral® 2000 Series is a high-speed 2 mm backpanel connector system consisting of right-angle receptacles and vertical headers. The 2000 Series features a unique stripline structure in both the receptacle and header. Apart from this stripline structure, it is similar to the FCI Standard Metral Connector. This stripline structure allows the Metral 2000 Series to have improved signal performance when routed in either a single-ended or a differential pair configuration.

The Metral 2000 Series is available in 5x6 and 8x12 module sizes for mid-plane applications. The system also features dedicated ground rows. For the 5-row connector, the dedicated ground row is the 3rd row. For the 8-row connector, the dedicated ground rows are the 3rd and 5th rows. Two-module monoblocks for the 5-row connector are available.

Metral 2000 Series connectors are designed to conveniently stack end-to-end with other FCI Metral products.



FEATURES & BENEFITS

- A shielded stripline transmission structure in both the header and receptacle
- Reduced crosstalk compared to the FCI Standard Metral Connector System
- Less than 5% multi-line active NEXT @ 200 ps (10-90%) rise time in differential applications
- Dual-beam receptacle contacts
- 200 mating cycles
- Available in 5- and 8-row configurations
- Rear plug up options
- Stackable end-to-end with other FCI Metral products
- Capability to provide customized select-load patterns in headers
- Press-fit headers and receptacles for easy installation with standard press tooling
- Repairable
- Lead-free and RoHS-compliant versions available

TARGET MARKETS / APPLICATIONS

- Communications
 - Transmission
 - Access
 - Switches
 - Routers
- Data
 - Servers
 - Storage Enclosures
- Industrial, Instrumentation and Medical
 - Rack-Based Systems

TECHNICAL INFORMATION

MATERIALS

- Housings: High-temperature, glass filled LCP, UL 94 V-0
- Receptacle contacts: Beryllium-copper
- Header pins: Phosphor-bronze
- Ground shields: Phosphor-bronze
- Plating:
 - Contact area: per Telcordia™ GR-1217-core for Central Office and Uncontrolled Environment
 - Press-fit tails: tin-lead or tin

MECHANICAL PERFORMANCE

- Mating force: 0.55 N max. per contact pair including ground and shield contacts
- Withdrawal force: 0.20 N min. per contact pair including ground and shield contacts
- Signal contact normal force: 0.39 N min. (EOL)

ELECTRICAL PERFORMANCE

- Operating temperature: -55°C to +105°C
- Current rating: 1 amp when all contacts are powered or 3 amps when one contact is powered at a 30°C max. temperature rise
- Contact resistance: 20 mΩ max.
- Insulation resistance: 1000 MΩ min.
- Signal integrity: Data and SPICE models are available at www.fciconnect.com/highspeed. Contact FCI for additional information.

SPECIFICATIONS

- IEC 61076-4-104
- FCI Product Specifications
 - GS-12-110 for 5-row connectors
 - GS-12-134 for 8-row connectors
- FCI Application Specifications
 - GS-20-010 for headers and shrouds
 - GS-20-017 for receptacles

APPROVALS & CERTIFICATIONS

- Recognized per UL/CSA
- Qualified per Telcordia GR-1217-CORE, Central Office (CO) and Uncontrolled Environment (UE)

PACKAGING

- Tubes

PART NUMBERS

Header	Receptacle	Number of Rows & Positions	For Card Thickness
74977-XXX	84688-XXX	5-Row 5x6	1.27 mm (0.050") - 2.54 mm (0.100")
74977-XXX	73981-XXX	5-Row 5x6	1.27 mm (0.050") - 2.54 mm (0.100")
84809-XXX	84854-XXX	5-Row 5x6	2.54 mm (0.100") - 3.40 mm (0.134")
74978-XXX	74981-XXX	8-Row 8x12	1.27 mm (0.050") - 3.40 mm (0.134")

Note: All Dash numbers -XXX represent available options such as plating types, pin lengths (for headers). Lead-free and RoHS-compliant products are designated by the addition of LF as a suffix to the dash number. For detailed product information, visit our on-line catalog at www.fciconnect.com/metral.

Use web link www.fciconnect.com/metral to obtain product drawings and additional technical information.

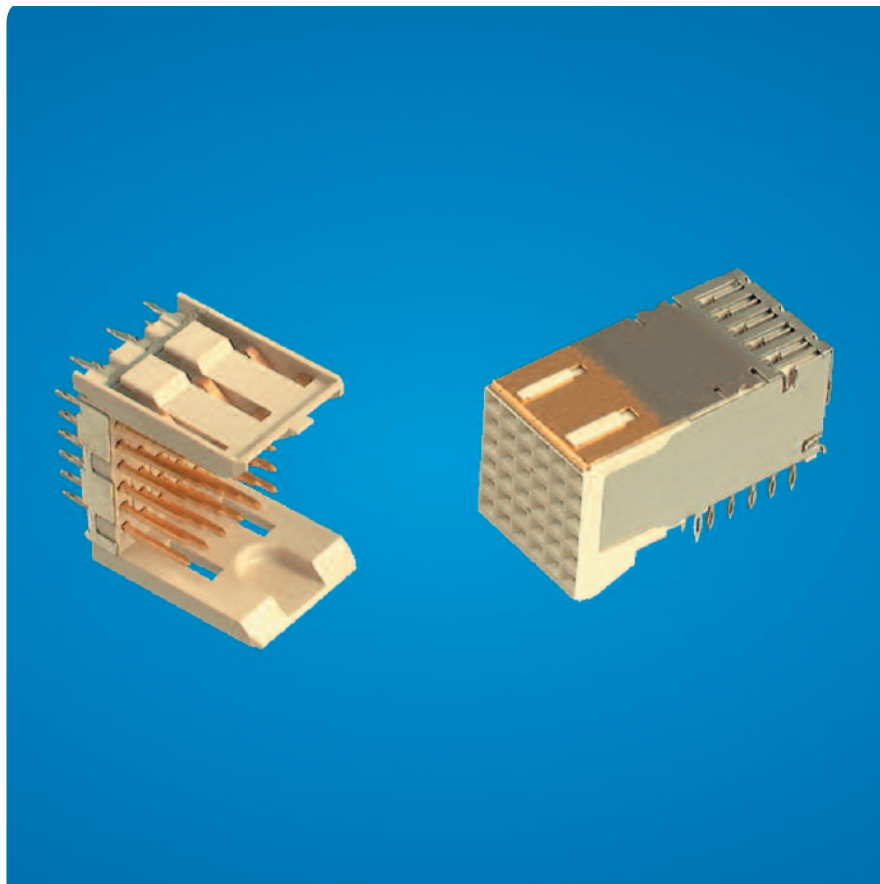
METRAL® 4000 SERIES

DESCRIPTION

FCI's Metral® 4000 Series is a high-speed 2 mm backpanel connector system consisting of right-angle receptacles and vertical headers. The 4000 Series features a unique stripline structure in both the receptacle and header. Compared to the Metral 1000 and 2000 Series, Metral 4000 receptacle connectors employ a modified receptacle contact geometry optimized for 100-ohm differential signals. This yields a better impedance match and lower insertion loss. Metral 4000 headers and receptacles also use a press-fit pin designed for 0.6mm drilled holes. The reduced hole diameter frees additional board space for trace routing and also results in lower capacitance.

The Metral 4000 Series is available in a 5x6 module size. In addition to having ground shields between columns, the 5-row connectors use the third row for ground connections.

Aside from the design enhancements to extend high-speed electrical performance up to 5 Gb/s, Metral 4000 Series connectors are similar to the FCI Standard Metral Connectors. The system is designed to conveniently stack end-to-end with other FCI Metral products.



FEATURES & BENEFITS

- A shielded stripline transmission structure in both the header and receptacle
- Contact geometry optimized for 100-ohm differential pairs
- Smaller 0.6mm hole diameter for better routing and lower capacitance
- Less than 1.0dB insertion loss at 5Gb/sec
- Reduced crosstalk compared to the Standard Metral Connector System
- Less than 5% multi-line active NEXT @ 100 ps (10-90%) rise time in differential applications
- Dual-beam receptacle contacts
- 200 mating cycles
- Stackable end-to-end with other FCI Metral products
- 5x6 module provides contact density of 25 pairs/inch (10 pairs/cm)
- Capability to provide customized select-load patterns in headers
- Press-fit headers and receptacles for easy installation with standard press tooling
- Repairable
- Lead-free and RoHS-compliant versions available

TARGET MARKETS / APPLICATIONS

- Communications
 - Transmission
 - Access
 - Switches
 - Routers
- Data
 - Servers
 - Storage Enclosures
- Industrial, Instrumentation and Medical
 - Rack-Based Systems

TECHNICAL INFORMATION

MATERIALS

- Housings: High-temperature, glass filled LCP, UL 94 V-0
- Receptacle contacts: Phosphor-bronze
- Header pins: Phosphor-bronze
- Ground shields: Phosphor-bronze
- Plating:
 - Contact area: per Telcordia™ GR-1217-core for Central Office and Uncontrolled Environment
 - Press-fit tails: tin-lead or tin

MECHANICAL PERFORMANCE

- Mating force: 0.55 N max. per contact pair including ground and shield contacts
- Withdrawal force: 0.20 N min. per contact pair including ground and shield contacts
- Signal contact normal force: 0.39 N min. (EOL)

ELECTRICAL PERFORMANCE

- Operating temperature: -55°C to +105°C
- Current rating: 1 amp when all contacts are powered or 3 amps when one contact is powered at a 30°C max. temperature rise
- Contact resistance: 20 mΩ max.
- Insulation resistance: 1000 MΩ min.
- Signal integrity: Data and SPICE models are available at www.fciconnect.com/highspeed. Contact FCI for additional information.

SPECIFICATIONS

- IEC 61076-4-104
- FCI Product Specification
 - GS-12-184
- FCI Application Specifications
 - GS-20-014 for headers and shrouds
 - GS-20-017 for receptacles

APPROVALS & CERTIFICATIONS

- Recognized per UL/CSA
- Qualified per Telcordia GR-1217-CORE, CentralOffice (CO)

PACKAGING

- Tubes

PART NUMBERS

Header	Receptacle	Number of Rows & Positions	For Daughter Card Thickness
55003-XXXXXX	52057-XXX	5-Row 5x6	1.27 mm (0.050") - 2.54 mm (0.100")
59569-XXXXXX	52062-XXX	5-Row 5x6	2.54 mm (0.100") - 3.40 mm (0.134")

Note: All Dash numbers, X's represent available options such as plating types, pin lengths (for headers). Lead-free and RoHS-compliant products are designated by the addition of LF as a suffix to the dash number. For detailed product information, visit our on-line catalog at www.fciconnect.com/metral.

Use web link www.fciconnect.com/metral to obtain product drawings and additional technical information.

METRAL® HIGH SPEED PRODUCTS

Family Name	Rows	Mounting Style	Product Specification	Application Specification	Plating Details	Mates With
1000 Series Header	5 and 8	Press-Fit, Vertical Stub Mount or Rear Plug Up	GS-12-110 (5 row) GS-12-134 (8 row) Meets IEC-61076-4-104	GS-20-010	Performance based against Telcordia CO & UE	1000 Series receptacle or 4000 Series receptacle
1000 Series Receptacle	5 and 8	Press-Fit, Right Angle	GS-12-110 (5 row) GS-12-134 (8 row) Meets IEC-61076-4-104	GS-20-017	Performance based against Telcordia CO & UE	1000 Series header 2000 Series header or 4000 Series header
2000 Series Header	5 and 8	Press-Fit, Vertical Stub Mount or Rear Plug Up	GS-12-110 (5 row) GS-12-134 (8 row) Meets IEC-61076-4-104	GS-20-010	Performance based against Telcordia CO & UE	1000 Series receptacle or 4000 Series receptacle
4000 Series Header	5	Press-Fit, Vertical Stub Mount only	GS-12-184 (5 row) Meets IEC-61076-4-104	GS-20-014	Performance based against Telcordia CO	1000 Series receptacle or 4000 Series receptacle
4000 Series Receptacle	5	Press-Fit, Right Angle	GS-12-184 (5 row) Meets IEC-61076-4-104	GS-20-017	Performance based against Telcordia CO	1000 Series header 2000 Series header or 4000 Series header

Use web link www.fciconnect.com/metral to obtain product drawings and additional technical information.

For more information on FCI sales offices,
headquarters, agents and local distributors,
visit www.fciconnect.com



Americas - Tel.: 1 (800) 237 2374

Europe - Tel.: 33 1 39 49 21 83

Asia/Pacific - Tel.: 65 6549 6666