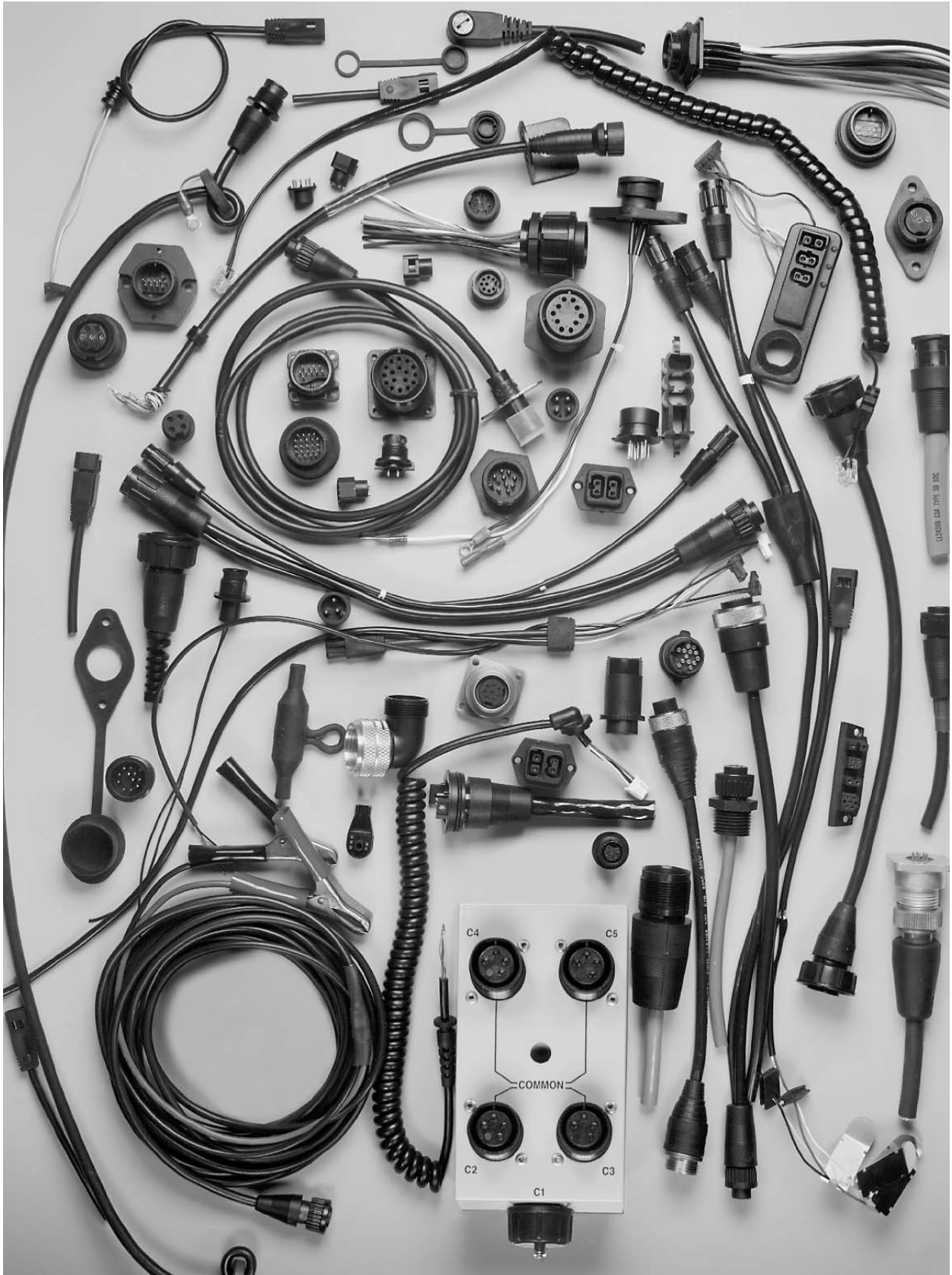


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* Please visit the product pages on our website for the most up-to-date product information

CUSTOM MOLDED CABLE ASSEMBLIES AND CONNECTORS



CUSTOM MOLDED CABLE ASSEMBLIES AND CONNECTORS

Conxall History

Conxall was founded in 1971 as a manufacturer of custom designed connectors and cable assemblies for the Marine and Industrial Markets. Since that time our custom designed products have become the standard for many other industries and Conxall's family of products has grown to include waterproof, water-tight and submersible connectors and assemblies. In recent years, Conxall has expanded its all plastic product lines to include metal shell, shielded connectors and cable assemblies designed to meet or exceed U.S., Canadian, and European shielding standards.

Connectors

Conxall was an innovator in the design of all plastic cylindrical connectors. The all plastic connector provides for substantial savings in cost without sacrificing performance and quality. The all plastic connector is corrosion resistant, non-conductive and withstands substantial abuse, hostile environments, and heavy impacts that would otherwise cause metal connectors to corrode, deform or become electrically conductive and thus become unusable or unsafe. Our standard lines of all plastic connectors covers a wide range of shell styles and insert configurations including the all plastic Mil-C-5015 Connector series which is intermateable with, and provides a high quality replacement for, expensive, all metal, military standard connectors.

Assembly Capabilities

Conxall has specialized in custom molded cable assemblies and connectors for a wide variety of applications including: Industrial, Automotive, Marine, Transportation, Medical, Communication, Sensor and Factory Automation. The Conxall exclusive molded cable assembly process affords the additional advantages of reduced cost and weather tight reliability plus the added benefits of permanent and service free termination without the risk of cable pull out. Our SENSOR-LINK, Mini, Micro, and Nano style connectors and cable assemblies are NEMA rated, available in shielded and standard styles and are UL and CSA certified for many applications. For additional information on SENSOR-LINK products please contact your Conxall Representative.

Custom Designs

Conxall remains dedicated to providing High Quality, Low Cost solutions to your interconnect problems. Our Service Teams will work with you from the initial design to the finished product to insure your complete satisfaction. We offer a full line of standard and weather tight connectors. But perhaps your needs are unique. If so, Conxall has the capability to create original designs to meet your needs. Our team of engineers and research and development personnel will work side by side with your staff to custom design a solution for your needs.

Contact Conxall for your Interconnection Solutions. Our quick response and personalized service set Conxall apart from any other company in the industry.

STANDARD CONNECTOR PRODUCTS

Low-cost Standard and Weathertight Connectors for Industrial and Marine Applications.

A completely indoor/outdoor connector system that offers performance and reliability features of MIL-Spec connectors at the cost of a commercial type product.

Economical...The all molded nylon construction provides for substantial savings in cost that helps hold the line on cost objectives without sacrificing performance.

Standard Assemblies

Ideally satisfies power connections for test instruments, calibration or measuring equipment, communications systems, data processing, entertainment devices and a wide range of non-environmental applications where economy and maintenance-free reliability are essential. Especially suited to laboratory instruments, medical analysis devices, automotive test equipment, computer peripherals, recording instruments, etc....

Style...Designed for demanding service although attractive and modern in appearance to complement the most sophisticated equipment.

Lightweight/Strong...50% weight savings over similar metal construction yet has tough, high-impact strength to withstand hard abuse both indoors and outdoors.

Weathertight Assemblies

Optional panel connector gaskets and interfacial "O" ring seals maintain a weathertight connection for outdoor use. The non-corrosive, high impact, all molded construction is perfect for recreational, agricultural or on/off the road vehicle connections. Hazards of electrical shock are minimized in addition to resistance to hostile outdoor environment. Frequently specified for depth sounders, metal detectors, marine/aircraft electronics, boat trailers, electronic farm implements, food processing equipment, etc.

Molded Cable Assemblies (See pages 3 & 26)

Complete Facilities to Assemble and/or Mold All Connector Styles to Many Cable Constructions

Permanently Molded...Cable and connectors are molded together in a choice of attractive boot shapes to add functional improvements to your product.

Accident Proof...Molded encapsulation between cable and connector prevents pull-out or breakage of internal wires for maintenance free operation.

Weathertight...This construction prevents ingress of moisture into contact areas.

Saves Time and Money...Avoids setting up new production line and training personnel plus cost of maintaining inventories.

STANDARD CONNECTOR FEATURES

Panel Connector mounts from behind in round or “D” shaped hole and are securely fastened with hex nut on the front of the panel. Standard assembly include weathertight gasket.

Premium Quality The standard screw-machine socket contact has premium design features at low cost. The closed entry prevents probe damage or accidental loss of spring retention due to misaligned or bent pins.

Reverse Contact Options are available providing pin or socket contacts in all styles.

Locking Type coupling ring prevents accidental disconnect. Quick 90 degree connect/disconnect rotation or threaded.

Cable Splices and/or extension cables can be easily made using the cable to cable connectors.

Unassembled Cable Connectors without mold-on cables are available. This option provides for field installation or replacement service on existing cable assemblies.

Dimensions and Specifications are for reference only and may change without notice where it does not affect form, fit or function.

Electrical Rating Tables are for reference only and are based on continuous current carrying capacity of the connector with all contacts carrying current.

Packaging and Warranty

Packaging

Connectors: Standard Con-X series components are packaged unassembled and individually bulk packed. Kitted packaging, one complete connector per bag, available upon request for an additional cost. Mil-E-Qual components are assembled and individually kitted in plastic bags.

Cable Assemblies: Assemblies less than 3 ft., including connector head, are bundled and boxed. Assemblies over 3 ft., including connector head, are coiled, secured with cable tie and boxed.

Warranty

CONXALL Corp. manufactures the finest quality product available to the marketplace. However, these products are intended to be used in accordance with the specifications described in this catalog. Any use or application that deviates from the stated operating specifications is not recommended and **may be unsafe**. A limited warranty applies to all CONXALL Corp. products. Except for obligations specifically assumed by CONXALL Corp. under warranty, CONXALL Corp. will not be liable for any loss, damage, cost of repairs, incidental or consequential damages of any kind whether or not based upon expressed or implied warranty, contract, negligence, or strict liability arising in connection with the design, manufacture, sale, use or repair of the products.

MICRO-CON-X® FIELD INSTALLABLE CONNECTORS



Cable Pin

1628X-XPX-XXX

Matching Mates:

- **Cable-Cable**
1828X-XSG-XXX
- **Panel**
172XX-XSG-XXX



Panel Mount

1728X-XXG-XXX

Matching Mates:

- **Cable Pin**
1628X-XPX-XXX
- **Cable Socket**
1628X-XSG-XXX



P/C Tail Panel Mount

172XX-XXG-XXX

Matching Mates:

- **Cable Pin**
1628X-XPX-XXX
- **Cable Socket**
1628X-XSG-XXX



Cable Socket

1628X-XSG-XXX

Matching Mates:

- **Cable-Cable**
1828X-XPX-XXX
- **Panel**
172XX-XPX-XXX



Cable to Cable

1828X-XXG-XXX

Matching Mates:

- **Cable Pin**
1628X-XPX-XXX
- **Cable Socket**
1628X-XSG-XXX



Dust Cap

16295

Molded Cable Assemblies (See pages 3 & 26)



Cable End



Cable to Cable



Right Angle

MICRO-CON-X® FIELD INSTALLABLE CONNECTORS

Dimensions (Dimensions in brackets are in millimeters)



CABLE END CONNECTOR - WITH SNAP LOCK BACKSHELL (NON-REMOVABLE)

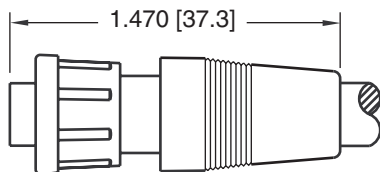


PANEL MOUNT CONNECTOR - SHOWN WITH HEX NUT AND GASKET



CABLE TO CABLE CONNECTOR - WITH SNAP LOCK BACKSHELL (NON-REMOVEABLE)

Molded Cable Assemblies (See pages 3 & 26)



CABLE END ASSEMBLY
STRAIGHT BOOT
0.280 [7.1] MAX. CABLE O.D.



CABLE TO CABLE ASSEMBLY
STRAIGHT BOOT
0.280 [7.1] MAX. CABLE O.D.



CABLE END ASSEMBLY
90° BOOT
0.280 [7.1] MAX. CABLE O.D.

MICRO-CON-X® FIELD INSTALLABLE CONNECTORS

Part Number to Order

XX X XX-XXG-3XX	
Connector Type: _____ 16 - Cable End 17 - Panel Mount 18 - Cable to Cable Contact Size: _____ 2 - #20 Contact Style: _____ 80 - Crimp (Supplied loose) 81 - P/C Tail .187" (4.7) (Supplied assembled) 82 - Solder Cup (Supplied assembled) 91 - P/C Tail .280" (7.1) (Supplied assembled)* 92 - P/C Tail .335" (8.5) (Supplied assembled)* Number of Contacts: _____ 2 or 3 Type of Contact: _____ P - Pin S - Socket Contact Plating: _____ G - Gold over Nickel (Standard)	Grommet Code – Cable O.D. Range: 11 - .09 - .14 (2.3-3.5) 15 - .15 - .17 (3.8-4.3) 18 - .18 - .20 (4.6-5.1) Back Shell Style 3 3 - Weathertight Grommet Grip/Seal & (1) interfacial "O" Ring 300 - Panel mount with hex nut & gasket 3ES - 300 with Epoxy

*Available in #20 size contact only.

Consult factory for optional threaded coupling.

Consult factory for your custom design cable assemblies and connectors. (See pages 3 & 26)

Contact Arrangements



Contact arrangements shown are wiring view of cable end pins/sockets.

Key/keyway shown for orientation only.

For higher density patterns, consult factory.

MICRO-CON-X® FIELD INSTALLABLE CONNECTORS

Specifications

Typical Specifications

Manufacturers Identifications

Description

Rating

Conductor Size

Configuration

Certification

Micro-Con-X®

Field Installable Connector & Custom Cable Assemblies

3.0 thru 7.5A, 600V

20 thru 24 AWG

2 & 3 #20 Contacts

UL Recognized File #E150822 - 250V

CSA Certified File #181200 - 600V

Material Specifications

Cable Pin/Socket

Backshell (Non-Removable Snap Lock)

Grommet

Coupling Ring

Contacts

Connector Body

O-Ring

Nylon, UL Recognized, Black

Santoprene Rubber, Black

Nylon, UL Recognized, Black

Brass, Gold over Nickel

Nylon, UL Recognized, Black

Neoprene Rubber, Black

Cable to Cable

Backshell (Non-Removable Snap Lock)

Grommet

Contacts

Connector Body

Nylon, UL Recognized, Black

Santoprene Rubber, Black

Brass, Gold over Nickel

Nylon, UL Recognized, Black

Panel Mount

Contacts

Panel Body

Gasket

Hex Nut

Brass, Gold over Nickel

Nylon, UL Recognized, Black

Neoprene Rubber, Black

Nylon, UL Recognized, Black

Optional

Dust Cap

Santoprene Rubber, Black (Part No. 16295)

Gasket, O-Ring, & Grommet materials are suitable for -40°C to +90°C (-40°F to +194°F). Consult factory for higher temperature requirements.

Mechanical Specifications

Durability

Vibration

Hex Nut Torque

Minimum 300 mate/unmate cycles without mechanical or electrical failure

Coupling rings have overriding locking feature to prevent loosening or separation of connector

All series hex nut to withstand 10-12 inch/lb tightening torque.

Electrical Specifications

Voltage

Current

600 V

See Electrical Current Rating Chart (Page 27)

Environmental Specifications

Temperature Rating

Corrosion

Weathertight

-40°C to +115°C (-40°F to +239°F)

300 Hr salt spray contacts

Consult factory with specific application

Molded Cable Assemblies

Watertight

(See Pages 3 & 26)

NEMA 6P, 13: IEC IP67

MINI-CON-X® FIELD INSTALLABLE CONNECTORS



Cable Pin

6X8X-XPG-XXX

Matching Mates:

- Cable-Cable
8X8X-XSG-XXX
- Panel
7XXX-XSG-XXX



Panel Mount

7X8X-XXG-XXX

Matching Mates:

- Cable Pin
6X8X-XPG-XXX
- Cable Socket
6X8X-XSG-XXX



P/C Tail Panel Mount

7XXX-XXG-XXX

Matching Mates:

- Cable Pin
6X8X-XPG-XXX
- Cable Socket
6X8X-XSG-XXX



Cable Socket

6X8X-XSG-XXX

Matching Mates:

- Cable-Cable
8X8X-XPG-XXX
- Panel
7XXX-XPG-XXX



Cable to Cable

8X8X-XXG-XXX

Matching Mates:

- Cable Pin
6X8X-XPG-XXX
- Cable Socket
6X8X-XSG-XXX



Dust Cap

6295



Winged Coupling Ring

W/6482

Molded Cable Assemblies (See pages 3 & 26)



Cable End



Cable to Cable



Right Angle

MINI-CON-X® FIELD INSTALLABLE CONNECTORS

Dimensions (Dimensions in brackets are in millimeters)



Molded Cable Assemblies (See pages 3 & 26)



MINI-CON-X® FIELD INSTALLABLE CONNECTORS

Part Number to Order

X X XX-XXG-XXX	
Connector Type: _____ 6 - Cable End 7 - Panel Mount 8 - Cable to Cable Contact Size: _____ 2 - #20 (2-8 Contacts) 3 - #16 (2-5 Contacts) Contact Style: _____ 80 - Crimp (Supplied loose) 81 - P/C Tail .187" (4.7) (Supplied assembled) 82 - Solder Cup (Supplied assembled) 91 - P/C Tail .280" (7.1) (Supplied assembled)* 92 - P/C Tail .335" (8.5) (Supplied assembled)* Number of Contacts: _____ 2, 3, 4, 5, 6, 7 & 8 Type of Contact: _____ P - Pin S - Socket Contact Plating: _____ G - Gold over Nickel (Standard)	Grommet Code – Cable O.D. Range: 11 - .09 - .14 (2.3 - 3.5) 15 - .15 - .17 (3.8 - 4.3) 18 - .18 - .20 (4.6 - 5.1) 21 - .21 - .23 (5.3 - 5.8) Back Shell Style 3 13 - .13 - .15 (3.3 - 3.8) 16 - .16 - .18 (4.1 - 4.6) 19 - .19 - .21 (4.8 - 5.3) 22 - .22 - .25 (5.6 - 6.3) Back Shell Style 5 Back Shell Style: 3 Weathertight grommet grip/seal & (1) interfacial "O" ring. 3DC - Daisy chain grommet with 3 I.D.s. (.125, .188 & .250) 5 Long back shell with extended grommet & cable grip. Use with crimp or solder. 300 - Panel mount with hex nut & gasket. 3ES - 300 with Epoxy

*Available in #20 size contact only.

Consult factory for optional threaded coupling.

Consult factory for your custom design cable assemblies and connectors. (See pages 3 & 26)

Contact Arrangements



Contact arrangements shown are wiring view of cable end pins/sockets.

Key/keyway shown for orientation only.

*Available in connector types: cable end socket, panel mount pin, and cable to cable pin styles only.

MINI-CON-X® FIELD INSTALLABLE CONNECTORS

Specifications

Typical Specifications

Manufacturers Identifications

Description

Rating

Conductor Size

Configuration

Certification

Mini-Con-X®

Field Installable Connector & Custom Cable Assemblies

4.8 thru 13.0A, 600V

#16 contacts, 16 thru 18 AWG

#20 contacts, 20 thru 24 AWG

2 thru 5 #16 Contacts or 2 thru 8 #20 Contacts

UL Recognized File #E150822 - 250V

CSA Certified File #181200 - 600V

Material Specifications

Cable Pin/Socket

Backshell (Removable Twist Lock)

Grommet

Coupling Ring

Contacts

Connector Body

O-Ring

Optional

Long Backshell (Removable Twist Lock)

Winged Coupling Ring

Cable to Cable

Backshell (Removable Twist Lock)

Grommet

Contacts

Connector Body

Panel Mount

Contacts

Panel Body

Gasket

Hex Nut

Optional

Dust Cap

Nylon, UL Recognized, Black

Santoprene Rubber, Black

Nylon, UL Recognized, Black

Brass, Gold over Nickel

Nylon, UL Recognized, Black

Neoprene Rubber, Black

Nylon, UL Recognized, Black (Style #5)

Nylon, UL Recognized, Black (W/6482)

Nylon, UL Recognized, Black

Santoprene Rubber, Black

Brass, Gold over Nickel

Nylon, UL Recognized, Black

Brass, Gold over Nickel

Nylon, UL Recognized, Black

Neoprene Rubber, Black

Nylon, UL Recognized, Black

Santoprene Rubber, Black (Part No. 6295)

Gasket, O-Ring, & Grommet materials are suitable for -40°C to +90°C (-40°F to +194°F).

Consult factory for higher temperature requirements.

Mechanical Specifications

Durability

Vibration

Hex Nut Torque

Minimum 300 mate/unmate cycles without mechanical or electrical failure

Coupling rings have overriding locking feature to prevent loosening or separation of connector

All series hex nut to withstand 10-12 inch/lb tightening torque.

Electrical Specifications

Voltage

Current

600 V

See Electrical Current Rating Chart (Page 27)

Environmental Specifications

Temperature Rating

Corrosion

Weathertight

-40°C to +115°C (-40°F to +239°F)

300 Hr salt spray contacts

Consult factory with specific application

Molded Cable Assemblies

Watertight

(See Pages 3 & 26)

NEMA 6P, 13; IEC IP67

MULTI-CON-X® FIELD INSTALLABLE CONNECTORS



Cable Pin
3X8X-XPX-XXX
Matching Mates:
• **Cable-Cable**
5X8X-XSG-XXX
• **Panel**
4XXX-XSG-XXX



Panel Mount
4X8X-XXG-XXX
Matching Mates:
• **Cable Pin**
3X8X-XPX-XXX
• **Cable Socket**
3X8X-XSG-XXX



P/C Tail Panel Mount
4XXX-XXG-XXX
Matching Mates:
• **Cable Pin**
3X8X-XPX-XXX
• **Cable Socket**
3X8X-XSG-XXX



Cable Socket
3X8X-XSG-XXX
Matching Mates:
• **Cable-Cable**
5X8X-XPX-XXX
• **Panel**
4XXX-XPX-XXX



Cable to Cable
5X8X-XXG-XXX
Matching Mates:
• **Cable Pin**
3X8X-XPX-XXX
• **Cable Socket**
3X8X-XSG-XXX



Mechanical Back Shell
(Style #5)



Square Flange Adapter
4296



Square Flange Gasket
4297



Dust Cap
4295



Winged Coupling Ring
W/4482

Molded Cable Assemblies (See pages 3 & 26)



Cable End



Cable to Cable



Right Angle

MULTI-CON-X® FIELD INSTALLABLE CONNECTORS

Dimensions (Dimensions in brackets are in millimeters)



Molded Cable Assemblies (See pages 3 & 26)



MULTI-CON-X® FIELD INSTALLABLE CONNECTORS

Part Number to Order

Connector Type: _____ 3 - Cable End 4 - Panel Mount 5 - Cable to Cable Contact Size: _____ 1 - #12 (2-4 Contacts) 2 - #20 (4-9 Contacts) 3 - #16 (4-6 Contacts) Contact Style: _____ 80 - Crimp (Supplied loose) 81 - P/C Tail .187" (4.7) (Supplied assembled) 82 - Solder Cup (Supplied assembled) 91 - P/C Tail .280" (7.1) (Supplied assembled)* 92 - P/C Tail .335" (8.5) (Supplied assembled)* Number of Contacts: _____ 2, 3, 4, 5, 6, 7, 8 & 9 Type of Contact: _____ P - Pin S - Socket Contact Plating: _____ G - Gold over Nickel (Standard)	X X XX-X XG-XXX	Grommet Code – Cable O.D. Range: 15 - .15 - .17 (3.8-4.3) 18 - .18 - .20 (4.6-5.1) 21 - .21 - .23 (5.3-5.8) 24 - .24 - .27 (6.1-6.8) 28 - .28 - .29 (7.1-7.4) 30 - .30 - .32 (7.6-8.1) Back Shell Style 3 or 5 Back Shell Style: 3 - Weathertight grommet grip/seal & (1) interfacial "O"ring. 3DC - Daisy chain grommet with 3 I.D.s (.125, .188 & .250) 5 - Mechanical screw-down cable clamp with grommet seal. 300 - Panel mount with hex nut & gasket. 3ES - 300 with Epoxy (Panel Mount Only)
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EMI/RFI shielded assemblies available - consult factory.
*Available in #20 size contact only.
Consult factory for optional threaded coupling.
Consult factory for your custom design cable assemblies and connectors. (See pages 3 & 26)

Contact Arrangements



Contact arrangements shown are wiring view of cable end pins/sockets.

Key/keyway shown for orientation only.

*Available in connector types: cable end socket, panel mount pin, and cable to cable pin styles only.

MULTI-CON-X® FIELD INSTALLABLE CONNECTORS

Specifications

Typical Specifications

Manufacturers Identifications

Description

Rating

Conductor Size

Configuration

Certification

Multi-Con-X®

Field Installable Connector & Custom Cable Assemblies

1.95 thru 23.0A, 600V

#12 Contacts, 12 thru 14 AWG

#16 Contacts, 16 thru 18 AWG

#20 Contacts, 20 thru 24 AWG

2 thru 4 #12 Contacts

4 thru 6 #16 Contacts

4 thru 9 #20 Contacts

UL Recognized File #E150822 - 250V

CSA Certified File #181200 - 600V

Material Specifications

Cable Pin/Socket

Backshell (Threaded)

Grommet

Coupling Ring

Contacts

Connector Body

O-Ring

Sleeve

Nylon, UL Recognized, Black (Style #3)

Santoprene Rubber, Black

Nylon, UL Recognized, Black

Brass, Gold over Nickel

Nylon, UL Recognized, Black

Neoprene Rubber, Black

Nylon, UL Recognized, Black

Cable to Cable

Backshell (Threaded)

Grommet

Contacts

Connector Body

Nylon, UL Recognized, Black (Style #3)

Santoprene, Rubber, Black

Brass, Gold over Nickel

Nylon, UL Recognized, Black

Optional

Long Backshell (Threaded)

Winged Coupling Ring

Mechanical Backshell (Threaded)

– Strap

– Screws

Nylon, UL Recognized, Black (Style #3 with solder contacts)

Nylon, UL Recognized, Black (W/4482)

Nylon, UL Recognized, Black (Style #5)

Nylon, UL Recognized, Black

Stainless Steel

Panel Mount

Contacts

Panel Body

Gasket

Hex Nut

Brass, Gold over Nickel

Nylon, UL Recognized, Black

Neoprene Rubber, Black

Nylon, UL Recognized, Black

Optional

Dust Cap

Square Flange Adapter

Square Flange Adapter Gasket

Santoprene Rubber, Black (Part No. 4295)

Nylon, UL Recognized, Black (Part No. 4296)

Neoprene Rubber, Black (Part No. 4297)

Gasket, O-Ring, & Grommet materials are suitable for -40°C to +90°C (-40°F to +194°F).

Consult factory for higher temperature requirements.

Mechanical Specifications

Durability

Vibration

Minimum 300 mate/unmate cycles without mechanical or electrical failure

Coupling rings have overriding locking feature to prevent loosening or separation of connector

All series hex nut to withstand 10-12 inch/lb tightening torque.

Hex Nut Torque

Electrical Specifications

Voltage

Current

600 V

See Electrical Current Rating Chart (Page 27)

Environmental Specifications

Temperature Rating

Corrosion

Weathertight

-40°C to +115°C (-40°F to +239°F)

300 Hr salt spray contacts

Consult factory with specific application

(See Pages 3 & 26)

NEMA 6P, 13; IEC IP67

Molded Cable Assemblies

Watertight

MAXI-CON-X® FIELD INSTALLABLE CONNECTORS



Cable Pin
13X8X-XXPG-XXX
Matching Mates:
• **Cable-Cable**
15X8X-XXSG-XXX
• **Panel**
14XXX-XXSG-XXX



Panel Mount
14X8X-XXXG-XXX
Matching Mates:
• **Cable Pin**
13X8X-XXPG-XXX
• **Cable Socket**
13X8X-XXSG-XXX



P/C Tail Panel Mount
14XXX-XXXG-XXX
Matching Mates:
• **Cable Pin**
13X8X-XXPG-XXX
• **Cable Socket**
13X8X-XXSG-XXX



Cable Socket
13X8X-XXSG-XXX
Matching Mates:
• **Cable-Cable**
15X8X-XXPG-XXX
• **Panel**
14XXX-XXPG-XXX



Cable to Cable
15X8X-XXXG-XXX
Matching Mates:
• **Cable Pin**
13X8X-XXPG-XXX
• **Cable Socket**
13X8X-XXSG-XXX



Winged Coupling Ring
W/14482



Dust Cap
14295

Molded Cable Assemblies (See pages 3 & 26)



Cable End



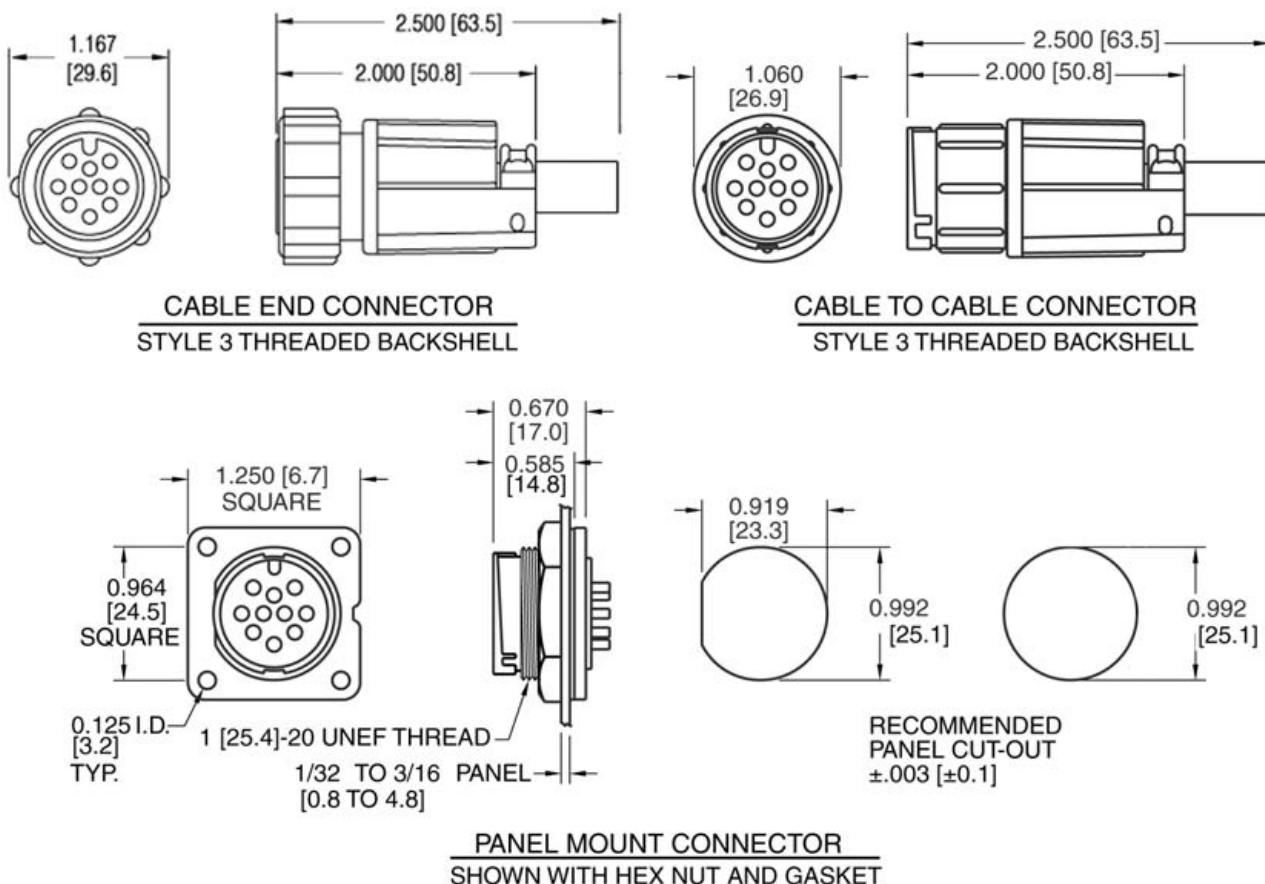
Cable to Cable



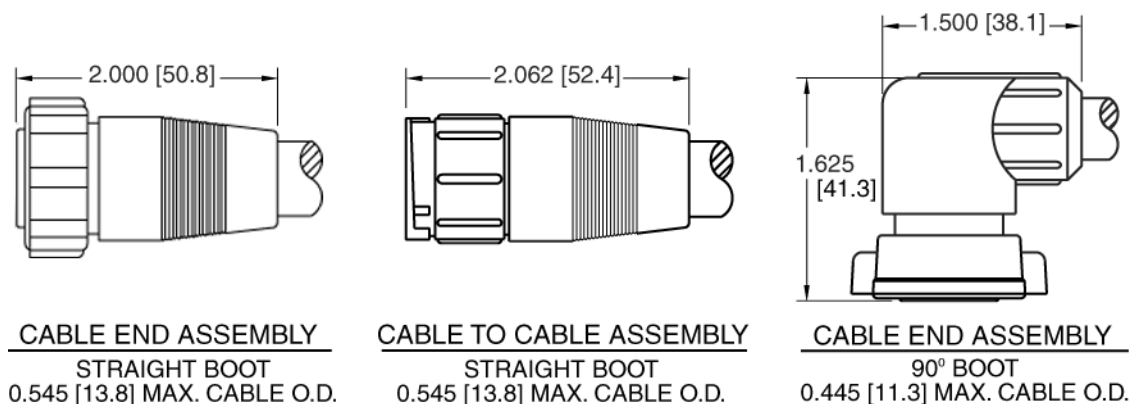
Right Angle

MAXI-CON-X® FIELD INSTALLABLE CONNECTORS

Dimensions (Dimensions in brackets are in millimeters)



Molded Cable Assemblies (See pages 3 & 26)



MAXI-CON-X® FIELD INSTALLABLE CONNECTORS

Part Number to Order

Connector Type: _____ 13 - Cable End 14 - Panel Mount 15 - Cable to Cable Contact Size: _____ 1 - #12 (7 Contacts) 2 - #20 (18 & 20 Contacts) 3 - #16 (10 Contacts) Contact Style: _____ 80 - Crimp (Supplied loose) 81 - P/C Tail .187" (4.7) (Supplied assembled) 82 - Solder Cup (Supplied assembled) 91 - P/C Tail .280" (7.1) (Supplied assembled)* 92 - P/C Tail .335" (8.5) (Supplied assembled)* Number of Contacts: _____ 7, 10, 18 & 20 Type of Contact: _____ P - Pin S - Socket Contact Plating: _____ G - Gold over Nickel (Standard) EMI/RFI shielded assemblies available - consult factory. *Available in #20 size contact only. Consult factory for optional threaded coupling. Consult factory for your custom design cable assemblies and connectors. (See pages 3 & 26)	XX X XX-XX XG-3XX Grommet Code - Cable O.D. Range: 21 - .21 - .25 (5.3-6.3) 26 - .26 - .30 (6.6-7.6) 31 - .31 - .38 (7.8-9.6) Back Shell Style: 3 Mechanical screw-down cable clamp with grommet seal and (1) interfacial "O" ring for cable end. 300 - Panel mount with hex nut & gasket. 3ES - 300 with Epoxy
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Contact Arrangements



Contact arrangements shown are wiring view of cable end pins/sockets.

Key/keyway shown for orientation only.

*Available in connector types: cable end socket, panel mount pin styles only.

MAXI-CON-X® FIELD INSTALLABLE CONNECTORS

Specifications

Typical Specifications

Manufacturers Identifications
Description
Rating
Conductor Size

Configuration

Certification

Maxi-Con-X®
Field Installable Connector & Custom Cable Assemblies
1.35 thru 23.0A, 600V
#12 Contacts, 12 thru 14 AWG
#16 Contacts, 16 thru 18 AWG
#20 Contacts, 20 thru 24 AWG
7 - #12 Contacts
10 - #16 Contacts
18 - #20 Contacts
20 - #20 Contacts
UL Recognized File #E150822 - 250V
CSA Certified File #181200 - 600V

Material Specifications

Cable Pin/Socket

Mechanical Backshell (Threaded)
Strap
Screws
Grommet
Coupling Ring
Contacts
Connector Body
O-Ring

Nylon, UL Recognized, Black
Nylon, UL Recognized, Black
Stainless Steel
Santoprene Rubber, Black
Nylon, UL Recognized, Black
Brass, Gold over Nickel
Nylon, UL Recognized, Black
Neoprene Rubber, Black

Optional

Winged Coupling Ring

Nylon, UL Recognized, Black (W/14482)

Cable to Cable

Mechanical Backshell (Threaded)
Grommet
Strap
Screws
Contacts
Connector Body

Nylon, UL Recognized, Black
Santoprene Rubber, Black
Nylon, UL Recognized, Black
Stainless Steel
Brass, Gold over Nickel
Nylon, UL Recognized, Black

Panel Mount

Contacts
Panel Body
Gasket
Hex Nut

Brass, Gold over Nickel
Nylon, UL Recognized, Black
Neoprene Rubber, Black
Nylon, UL Recognized, Black

Optional

Dust Cap

Santoprene Rubber, Black (Part No. 14295)

Gasket, O-Ring, & Grommet materials are suitable for -40°C to +90°C (-40°F to +194°F). Consult factory for higher temperature requirements.

Mechanical Specifications

Durability

Minimum 300 mate/unmate cycles without mechanical or electrical failure

Vibration

Coupling rings have overriding locking feature to prevent loosening or separation of connector

Hex Nut Torque

All series hex nut to withstand 10-12 inch/lb tightening torque

Electrical Specifications

Voltage
Current

600 V
See Electrical Current Rating Chart (Page 27)

Environmental Specifications

Temperature Rating
Corrosion
Weathertight

-40°C to +115°C (-40°F to +239°F)
300 Hr salt spray contacts
Consult factory with specific application

Molded Cable Assemblies

Watertight

(See Pages 3 & 26)
NEMA 6P, 13: IEC IP67

MEGA-CON-X® FIELD INSTALLABLE CONNECTORS



Cable Pin
23X8X-XXPG-XXX
Matching Mate:
• **Panel**
24XXX-XXSG-XXX



Panel Mount
24XXX-XXXG-XXX
Matching Mates:
• **Cable Pin**
23X8X-XXPG-XXX
• **Cable Socket**
23X8X-XXSG-XXX



Cable Socket
23X8X-XXSG-XXX
Matching Mate:
• **Panel**
24XXX-XXPG-XXX



P/C Tail Panel Mount
24XXX-XXXG-XXX
Matching Mates:
• **Cable Pin**
23X8X-XXPG-XXX
• **Cable Socket**
23X8X-XXSG-XXX



Dustcap
24295

Molded Cable Assemblies (See pages 3 & 26)



Cable End



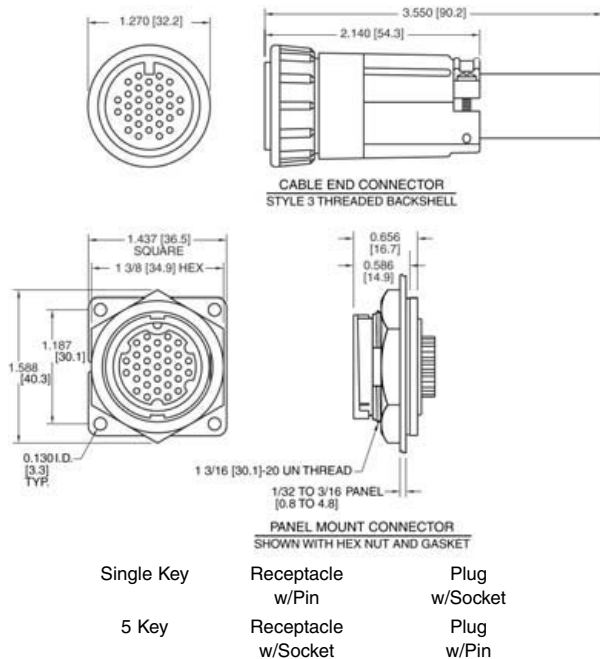
Right Angle

MEGA-CON-X® FIELD INSTALLABLE CONNECTORS

Quick Connect Type

Threaded Type

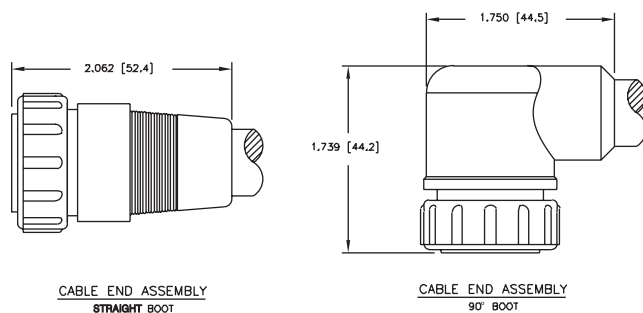
Dimensions (Dimensions in brackets are in millimeters)



Panel Cutout



Molded Cable Assemblies (See pages 3 & 26)



MEGA-CON-X® FIELD INSTALLABLE CONNECTORS

Part Number to Order

Connector Type: _____ 23 - Cable End 24 - Panel Mount Contact Size: _____ 2 - #20 Contact Style: _____ 80 - Crimp (Supplied loose) 81 - P/C Tail .187" (4.7) (Supplied assembled) 82 - Solder Cup (Supplied assembled) 91 - P/C Tail .280" (7.1) (Supplied assembled)* 92 - P/C Tail .335" (8.5) (Supplied assembled)* Number of Contacts: _____ 31 Type of Contact: _____ P - Pin S - Socket Contact Plating: _____ G - Gold over Nickel (Standard)	XX X XX-XX XG-T3XX	Back Shell Style 3 Grommet Code – Cable O.D. Range: 50 -.51 - .56 (12.9 - 14.2) Back Shell Style: 3 Mechanical screw-down cable clamp with grommet seal and (1) interfacial "O" ring for cable end. 300 - Panel mount with hex nut & gasket. 3ES - 300 with Epoxy Coupling Type Blank - Twist Lock T - Threaded
--	----------------------------------	--

*Available in #20 size contact only.

Consult factory for your custom design cable assemblies and connectors. (See pages 3 & 26)

Contact Arrangements



Contact arrangements shown are wiring view of cable end pins/sockets.
Key/keyway shown for orientation only.

MEGA-CON-X® FIELD INSTALLABLE CONNECTORS

Specifications

Typical Specifications

Manufacturers Identifications
Description
Rating
Conductor Size
Configuration
Certification

Mega-Con-X®
Field Installable Connector & Custom Cable Assemblies
0.9 thru 2.3A, 600V
20 thru 24 AWG
31 - #20 Contacts
UL Recognized File #E150822 - 250V
CSA Certified File #181200 - 600V

Material Specifications

Cable Pin/Socket

Mechanical Backshell (Threaded)
Strap
Screws
Grommet
Coupling Ring
Contacts
Connector Body
O-Ring

Nylon, UL Recognized, Black
Nylon, UL Recognized, Black
Stainless Steel
Santoprene Rubber, Black
Nylon, UL Recognized, Black
Brass, Gold over Nickel
Nylon, UL Recognized, Black
Neoprene Rubber, Black

Panel Mount

Contacts
Panel Body
Gasket
Hex Nut

Brass, Gold over Nickel
Nylon, UL Recognized, Black
Neoprene Rubber, Black
Nylon, UL Recognized, Black

Gasket, O-Ring, & Grommet materials are suitable for -40°C to +90°C (-40°F to +194°F). Consult factory for higher temperature requirements.

Mechanical Specifications

Durability

Minimum 300 mate/unmate cycles without mechanical or electrical failure

Vibration

Coupling rings have overriding locking feature to prevent loosening or separation of connector

Hex Nut Torque

All series hex nut to withstand 10-12 inch/lb tightening torque

Electrical Specifications

Voltage
Current

600V
See Electrical Current Rating Chart (Page 27)

Environmental Specifications

Temperature Rating
Corrosion
Weathertight

-40°C to +115°C (-40°F to +239°F)
300 Hr salt spray contacts
Consult factory with specific application

Molded Cable Assemblies

Watertight

(See Pages 3 & 26)
NEMA 6P, 13: IEC IP67

CON-X MOLDED CABLE ASSEMBLY CHECK LIST

Company Name: _____ Customer Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Website: _____ E-mail: _____

Annual Usage Quantity: _____ Monthly Usage Quantity: _____

Does the assembly need to be RoHS compliant? Yes: _____ No: _____

Cable Vendor and Part Number (if available): _____

Cable Outer Jacket - Color: _____ Material: _____ OD: _____

Number of Conductors: _____ Conductor AWG: _____ Stranding: _____

Conductor Colors: _____

Is there a drain wire? _____ Is the drain wire terminated? _____

*If the drain wire is terminated, be sure to indicate where on pin-out diagram.

Is the cable shielded? _____ How? Foil _____ Braid _____ %

*If the shield is braided, be sure to indicate where on the pin-out diagram.

Will the Customer supply the cable for production? _____

Cable Cut Length: _____ Overall Assembly Length: _____

Does the Cable Assembly have Environmental Requirements? _____

If yes, please list them: _____

Must overmold have a moisture bond to the cable's outer jacket? _____

Is the Cable Assembly: Single ended: _____ Double Ended: _____

Do the connectors need to be shielded? _____

If yes, do they need to be: 180° shield: _____ OR Shield thru pin: _____

End "A" Connector Part Number: _____ Right Angle? _____

End "B", will that end need processing? _____ If yes, indicate below: _____

Outer jacket strip length: _____ Inner Conductor strip length: _____ Tinned? _____

Does end "B" have any special inclusions? If yes, please list them: _____

Note: Please submit a diagram of the color code pin-out, showing which conductors are wired to which pin position. Be sure to show drain and shield terminations, if needed. Indicate empty pins or spaces to be molded closed where required. If a drawing assembly is available, please send it also.

CON-X ELECTRICAL CURRENT RATING CHART FOR CONNECTORS & CABLE ASSEMBLIES

CONTACT SIZE	CONDUCTOR SIZE - AWG	NUMBER of CONDUCTORS	CURRENT RATING
#12	#12	1 through 7	23.0A
		1 through 3	17.0A
	#14	4 through 6	12.75A
		7 through 9	11.0A
		1 through 3	13.0A
	#16	4 through 6	9.75A
		7	8.45A
#16	#16	1 through 10	13.0A
		11 and 12	7.5A
	#18		
		1 through 3	10.0A
		4 through 12	7.5A
#20	#18	1 through 3	7.5A
		4 through 20	5.6A
		21 through 31	2.3A
	#20	1 through 3	7.5A
		4 through 20	5.6A
		21 through 31	2.3A

Max. Number and Size of Contacts per Series:

- 4 - #12 Multi-Con-X
- 7 - #12 Maxi-Con-X
- 5 - #16 Mini-Con-X
- 6 - #16 Multi-Con-X
- 12 - #16 Maxi-Con-X
- 3 - #20 Micro-Con-X
- 8 - #20 Mini-Con-X
- 9 - #20 Multi-Con-X
- 20 - #20 Maxi-Con-X
- 31 - #20 Mega-Con-X

* Please visit the product pages on our website for the most up-to-date product information

MIL-E-QUAL® EQUIVALENT TO MIL-C-5015



Cable Socket

CXX 3106A XXXX XX S XXX



Box Receptacle Pin

CXX 3102A XXXX XX P XXX



Cable Pin

CXX 3106A XXXX XX P XXX



Box Receptacle Socket

CXX 3102A XXXX XX S XXX



Cable Cap

4XX96



Receptacle Cap

4XX95

Molded Cable Assemblies (See pages 3 & 33)



Cable Pin

MIL-E-QUAL® EQUIVALENT TO MIL-C-5015

Connector Size	L	N	Q	V Fitting Threads
	INCH MM	INCH MM	INCH MM	
10SL	1.800 45.7	1.200 30.5	.900 22.9	1/2-20
12S	1.900 48.3	1.200 30.5	1.000 25.4	5/8-24
14S	1.900 48.3	1.300 33	1.200 30.5	3/4-20
16S	2.200 56.	1.425 36.2	1.250 31.8	7/8-20
16	2.400 61.	1.425 36.2	1.250 31.8	7/8-20
18	2.570 65.3	1.425 36.2	1.420 36.1	1-20
20	2.450 62.2	1.425 36.2	1.450 36.8	1-1/8-18
22	2.450 62.2	1.425 36.2	1.600 40.6	1-1/4-18
24	2.570 65.3	1.425 36.2	1.725 43.8	1-3/8-18
28	2.570 65.3	1.425 36.2	1.975 50.2	1-5/8-18

Connector Size	A Coupling Threads	K Inch MM	L Inch MM	M Inch MM	R Inch MM	S Inch MM	C Inch MM	Z Inch MM
10SL	5/8-24	.080 2	.940 23.9	9/16 14.3	23/32 18.3	1 25.4	3.5 88.9	.635 16.1
12S	3/4-20	.080 2	1.030 26.2	9/16 14.3	13/16 20.6	1-3/32 27.8	3.5 88.9	.760 19.3
14S	7/8-20	.080 2	1.143 29	9/16 14.3	29/32 23	1-3/16 30.2	3.5 88.9	.885 22.5
16S	1-20	.142 3.6	1.180 30	9/16 14.3	31/32 24.6	1-9/32 32.5	3.5 88.9	1.010 25.7
16	1-20	.142 3.6	1.350 34.3	3/4 19	31/32 24.6	1-9/32 32.5	3.5 88.9	1.010 25.7
18	1-1/8-18	.142 3.6	1.330 33.8	3/4 19	1-1/16 27	1-3/8 34.9	5.0 127.0	1.135 28.8
20	1-1/4-18	.142 3.6	1.330 33.8	3/4 19	1-5/32 29.4	1-1/2 38.1	5.0 127.0	1.260 32.0
22	1-3/8-18	.142 3.6	1.220 31.0	3/4 19	1-1/4 31.8	1-5/8 41.3	5.0 127.0	1.385 35.2
24	1-1/2-18	.142 3.6	1.220 31.0	13/16 20.6	1-3/8 34.9	1-3/4 44.5	6.0 152.4	1.510 38.4
28	1-3/4-18	.142 3.6	1.220 31.0	13/16 20.6	1-9/16 39.7	2 50.8	6.0 152.4	1.760 44.7



MIL-E-QUAL® EQUIVALENT TO MIL-C-5015

Contact Arrangements



Contact Arrangements shown are mating view of pin insert (socket opposite).

Unless otherwise specified, arrangements are per MIL-STD-1651A. for alternate key positions, consult factory.

*Available in connector types: cable end socket, panel mount pin styles only.

MIL-E-QUAL® EQUIVALENT TO MIL-C-5015

Part Number to Order

CX X 310XA XXXX XX X XXX

CONXALL

Molded Equivalent
to MIL-C-5015

Contact Style

S - Solder
C - Crimp

Shell Type

(See Note 1)

3101A Cable Receptacle (in-line)
(See Note 3)

3102A Box Receptacle

3106A Straight Plug (See Note 2)

Note 1 - All plugs and receptacles include crimp or solder contacts specified.

Note 2 - Straight Plugs include back shell assembly with cable clamp and bushing.

Note 3 - For overmolded cable construction only. Consult factory for availability.

Deviations

-300 Weathertight
Option adds:
"O" Ring for plug
(3106A)
Rubber Gasket
for receptacle
(3102A)

-010 Receptacle with (4)
mounting hole rein-
forcement bosses.
Consult factory for
availability.

-310 Same as -010 except
with rubber gasket.

Contacts

P - Pin
S - Socket

Insert Number/Arrangement

All inserts are integrally molded with connector shells for one piece construction. Contact factory for alternative W, X, Y or Z insert positions.

Bushing Sizes Provided

Plug Shell Size	Max. Cable Dia.
10SL, 12S	1/4"
14S	5/16"
16S, 16	7/16"
18	9/16"
20, 22	5/8"
24, 28	3/4"

Shell/Insert Sizes

10SL-4	16S-1	18-19
10SL-3	16S-8	20-7
12S - 3	16 - 10	20-16
14S - 1	18 - 1	20-27
14S - 2	18 - 4	20-29
14S - 5	18 - 8	22-14
14S - 6	18 - 10	24-2
14S - 7	18 - 11	24-28
14S - 9	18 - 12	28-2
		28-12
		28-21

Consult factory for your custom design assemblies and connectors. (See pages 3 & 33)

MIL-E-QUAL® EQUIVALENT TO MIL-C-5015

Specifications

Typical Specifications

Manufacturers Identifications
Description
Rating
Conductor Size
Configuration
Certification

MIL-E-QUAL®
Field Installable Connector & Custom Cable Assemblies
3.4 thru 23.0A, 600V
12 thru 20 AWG
2 thru 37 Contacts per Mil - C-5015
UL Recognized File #E150822 - 250V
CSA Certified File #181200-500V

Material Specifications

Cable Pin/Socket

Mechanical Backshell (Threaded)
Strap
Screws
Grommet
Coupling Ring
Contacts
Connector Body

Nylon, UL Recognized, Black with UV Inhibitor
Nylon, UL Recognized, Black with UV Inhibitor
Zinc Plated
Santoprene Rubber, Black
Nylon, UL Recognized, Black with UV Inhibitor
Brass, Standard Silver Plated, Gold Plated Optional
Nylon, UL Recognized, Black with UV Inhibitor

Optional

Connector Cap
O-Ring
Different Keyways Available
Gold Contacts

Nylon, UL Recognized, Black with UV Inhibitor (4XX96)
Neoprene Rubber, Black

Brass, Gold over Nickel

Box Receptacle

Contacts
Receptacle Body

Brass, Standard Silver Plated, Gold Plated Optional
Nylon, UL Recognized, Black with UV Inhibitor

Optional

Receptacle Cap
Gasket
Gold Contacts
Extended Bosses
Different Keyways Available

Nylon, UL Recognized, Black with UV Inhibitor (4XX95)
Neoprene Rubber, Black
Brass, Gold over Nickel

Gasket, O-Ring, & Grommet materials are suitable for -40°C to +90°C (-40°F to +194°F). Consult factory for higher temperature requirements.

Electrical Specifications

Voltage
Current

500 V
See Electrical Current Rating Chart (Page 34)

Environmental Specifications

Temperature Rating
Corrosion
Durability
Weathertight

-40°C to +125°C (-40°F to +257°F)
48 Hr salt spray contacts
300 mate/unmate cycles minimum
Consult factory with specific application

Molded Cable Assemblies

Watertight

(See Pages 3 & 33)
NEMA 6P, 13: IEC IP67

MIL-E-QUAL® MOLDED CABLE ASSEMBLY CHECK LIST

EQUIVALENT TO MIL-C-5015

Company Name: _____ Customer Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____

Website: _____ E-mail: _____

Annual Usage Quantity: _____ Monthly Usage Quantity: _____

Does the assembly need to be RoHS compliant? Yes: _____ No: _____

Cable Vendor and Part Number (if available): _____

Cable Outer Jacket - Color: _____ Material: _____ OD: _____

Number of Conductors: _____ Conductor AWG: _____ Stranding: _____

Conductor Colors: _____

Is there a drain wire? _____ Is the drain wire terminated? _____

*If the drain wire is terminated, be sure to indicate where on pin-out diagram.

Is the cable shielded? _____ How? Foil _____ Braid _____ % _____

*If the braid is terminated, be sure to indicate where on the pin-out diagram.

Will the Customer supply the cable for production? _____

Cable Cut Length: _____ Overall Assembly Length: _____

Does the Cable Assembly have Environmental Requirements? _____

If yes, please list them: _____

Must overmold have a moisture bond to the cable's outer jacket? _____

Is the Cable Assembly: Single ended: _____ Double Ended: _____

Do the connectors need to be shielded? _____

If yes, do they need to be: 180° shield: _____ OR Shield thru pin: _____

End "A" Connector Part Number: _____ Right Angle? _____

End "B" Connector Part Number: _____ Right Angle? _____

If no conductor on end "B", will that need processing? _____ If yes, indicate below:

Outer jacket strip length: _____ Inner Conductor strip length: _____ Tinned? _____

Does end "B" have any special inclusions? If yes, please list them: _____

Note: Please submit a diagram of the color code pin-out, showing which conductors are wired to which pin position. Be sure to show drain and shield terminations, if needed. Indicate empty pins or spaces to be molded closed where required. If a drawing assembly is available, please send it also.

MIL-E-QUAL® ELECTRICAL CURRENT RATING CHART FOR CONNECTORS & CABLE ASSEMBLIES

Contact Size	Conductor Size - AWG	Number of Conductors	Current Rating
#12	#12	1 through 3	23.0A
		4 through 6	17.0A
		7 through 9	13.0A
	#14	1 through 3	17.0A
		4 through 6	12.75A
		7 through 9	11.0A
#16	#16	1 through 3	13.0A
		4 through 6	9.75A
		7 through 10	8.45A
		10 through 20	5.85A
		21 through 30	4.55A
		31 and up	3.9A
	#18	1 through 3	10.0A
		4 through 6	7.5A
		7 through 9	6.5A
		10 through 20	4.5A
		21 through 30	3.5A
		31 and up	3.0A
	#20	1 through 3	7.5A
		4 through 6	5.6A
		7 through 9	4.8A
		10 through 20	3.4A
		21 through 30	2.62A
		31 and up	2.3A

TOOLING

Contact Insertion & Removal Tools



356-XXX Bits



356-1 Handle

Manual Crimp Tool
(Multi-contact)



Handle

Positioner

Manual Crimp Tool
(Single Purpose)



Locator

Handle

TOOLING

Contact Insertion/Removal Tools

Con-X Series	Connector Size	Contact Size	Insertion Bits Pins or Sockets	Handle for Bits
	2-7 contacts	#12 .093" (2.4)	356-12	356-1
	2-10 contacts	#16 .062" (1.6)	356-16	356-1
	2-31 contacts	#20 .040" (1)	356-20	356-1

MIL-E-QUAL Series	Connector Size	Contact Size	Insertion Bits Pins or Sockets	Handle for Bits
All Mil-E-Qual Connector Sizes		#12 .093" (2.4)	356-12	356-1
		#16 .062" (1.6)	356-16	356-1

Product not designed to remove contacts after insertion. Consult factory for removal tools.

Manual Contact Crimping Tools

Con-X Series	Contact Size	Handle for Tool	Description	Contact Positioners for Tools
	#12, #16, & #20	359-24	Multi Contact Tool	357-124
	#20 Only	359-21	Single Purpose Tool	357-122

MIL-E-QUAL Series	Contact Size	Handle for Tool	Description	Contact Positioners for Tools
	#12 .093" (2.4)	359-24	Hand Crimp Tool	358-112
	#16 .062" (1.6)	359-24	Hand Crimp Tool	358-112

Pneumatic Crimping Tools - Consult Factory

Contact Crimping and Assembly Procedures:

- A. Push cable through connector components, i.e. backshell, grommet, sleeve, and coupling ring.
- B. Wire preparation: Strip cable to dimensions shown. Make all cuts square and sharp being careful not to nick wires when cutting. To prevent stranded wires from fraying it is recommended that ends be tightly twisted and not solder dipped.

Conductor Strip Lengths

CON-X	MIL-E-QUAL
#20 -3/16	#16 -9/32
#16 -7/32	#12 -7/32
#12 -7/32	



Cable Stripping

- C. Contact crimping tools, use as follows:
 - ☐ Assemble contact locator to tool.
 - ☐ Check tool setting for wire gage to be crimped.
 - ☐ Drop contacts, mating end first into locator so that it rests fully on bottom. Insert stripped lead into contact barrel until it stops.
 - ☐ Close tool handles completely in one stroke. (The ratchet will not release jaws until tool has completed cycle.)
 - ☐ Inspect crimp to be sure there are no loose strands outside the contact which may short out to an adjacent contact.
- D. Contact insertion tools. Place wired contact into proper connectors cavity. Guide tip of the insertion tool so that it starts at the contact and slides down against the stop. Apply a steady force perpendicular to the contact until it snaps into position.

* Please visit the product pages on our website for the most up-to-date product information

NOTES