

# Amphenol® Heavy Duty Cylindrical Connectors

12-052-9



**MIL-C-22992  
Class L, QWLD**

**Amphenol**

# Amphenol® Heavy Duty Cylindrical Connectors

## MIL-C-22992/Proprietary

- **High Current Capacity**
- **Rugged Construction**
- **Safety**
- **Serviceability**

Amphenol meets the demands for heavy duty connectors by providing three cylindrical connector series, each with unique design characteristics for reliable operation in specific industrial environments.

**Class “L”** – for the heaviest electrical loads (Pages 2 – 19)

- Current range from 40 to 200 amperes
- Direct current or single/three phase, 60/400 Hertz alternating current
- Automatic grounding for safety
- MIL-C-22992 qualification

**QWLD** – for most power and control circuits (Pages 21 – 77)

- Military (MIL-C-22992) qualified connectors and industrial equivalents available
- Increased shell size for greater durability than similar standard connectors

**QWL** – a more compact heavy duty design for industrial power and control applications (Page 78, references Amphenol Catalog 12-053)

These three series share the following common characteristics which are critical to reliable heavy duty connectors:

- Resistance to the operating environment. Refer to environmental data, below.
- Double stub coupling threads for faster connections; no cross threading, easy cleaning.
- Left hand accessory threads to minimize cable twisting, wire breakage, accidental connector disassembly.
- Gaskets or O-rings at appropriate surfaces for perfect weathertight connections.

Amphenol® heavy duty connectors have been exposed to the following environmental conditions, without compromise of mechanical integrity or degradation of electrical performance.



| Condition                                         | Configuration     | Description                                                                                                   | Reference                                   |
|---------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Thermal Shock                                     | Unmated           | Five complete one hour temperature cycles of –55°C to +125°C                                                  | MIL-STD-1344, method 1003, test condition A |
| Moisture Resistance<br>(Cable mounted connectors) | Mated             | Ten complete 24 hour cycles of +25°C to +65°C temperature at 90% to 98% humidity                              | MIL-STD-202, method 106                     |
| Durability                                        | Mated             | 500 complete mating/unmating cycles                                                                           | MIL-C-22992                                 |
| Salt Spray<br>(Corrosion)                         | Unmated           | 48 hour exposure to atomized 5% saline solution at +35°C                                                      | MIL-STD-1344, method 1001                   |
| Vibration                                         | Mated             | 10 to 55 Hz, .06 inch total excursion in 1 minute cycles for 6 hours, 55 to 2000 Hz, 10G peak amplitude sweep | MIL-STD-1344, method 2005                   |
| High Impact                                       | Mated             | Nine hammer blows from 1, 3 and 5 feet, three each in three axes on mounting panel                            | MIL-STD-202, method 207                     |
| Heat Rise (Class L only)                          | Mated             | Maximum rated DC current for four hours at +25°C in still air                                                 | MIL-C-22992                                 |
| Fluid Immersion                                   | Unmated           | 20 hours immersion in hydraulic fluid and lubricating oil                                                     | MIL-C-22992                                 |
| Water Immersion                                   | Mated and Unmated | 4 hours immersion at 1 atmosphere pressure differential                                                       | MIL-C-22992                                 |

# Amphenol® Heavy Duty Cylindrical Connectors

## MIL-C-22992, Class L



The Amphenol® Class L\* heavy duty connectors are the largest size cylindricals, highly suitable for industrial or military applications, and designed to meet the demands of heavy power interconnections.

The design features of this connector series provide:

- **Greatest Capacity** - current ranges 40 to 200 amps, conductor sizes 6 to 4/0
- **Safety** - complete protection of personnel and equipment if connectors are inadvertently disconnected under load
- **Foolproof Mating** - design incorporates specific voltage, current, frequency, phase and grounding requirements
- **Standardization** - MIL-C-22992 Class L insert arrangements specify connector/cable combinations for maximum reliability
- **Serviceable Contacts** - contacts are normally crimped to the cable before connector assembly. No insertion tools required. Bushings are available to adapt smaller diameter wires to larger contacts

\* Amphenol design is covered by one or more of the following U. S. Patent Numbers: 3,023,396; 3,221,292.

# Amphenol® Heavy Duty Cylindrical Connectors

## MIL-C-22992, Class L

Class L connectors are available only in the specific configurations prescribed by MIL-C-22992 for either military or industrial applications. This rigid configuration control assures correct interconnection of electrical circuits for maximum safety and reliability. Controlled parameters include:

**Connector shell style and contact type** - wall mount and cable connecting receptacles are supplied with socket contacts only and always lead from the power source. Plugs (with coupling rings) have pin contacts only and always lead to the equipment end.

**Shell size** - the direct relationship of shell size to current carrying capability reduces the possibility of inadequate wiring for heavy electrical loads.†

| Shell Size | Current Rating (Amperes) | Contact Size |
|------------|--------------------------|--------------|
| 28         | 40                       | 6            |
| 32         | 60                       | 4            |
| 44         | 100                      | 1/0          |
| 52         | 200                      | 4/0          |

**Keyway position** - four positions of the main keyway are used to discriminate between the following power sources:

two wire D.C.  
two wire single phase A.C.  
three wire single phase A.C.  
four wire three phase A.C.

**Insert rotation** - when carrying alternating current (A.C), different angular rotations of the insert within the connector shell are used to distinguish between 60 Hertz and 400 Hertz circuits.

### Other outstanding design features:

**Arc quenching design** - recessed socket contacts within the insert create an arc suppressing chamber which protects the user when connectors are separated under load.

**Programmed coupling sequence** - grounding and neutral contacts engage before power contacts.

**Waterproof design** - a unique combination of grommets and seals provides waterproofing in any condition - mated or unmated, capped or uncapped.

**Rugged construction** - machined from high strength aluminum. Straight-line attachment of accessories eliminates possibility of cable twisting or misalignment.

**Accessories** - supplied with all Class L connectors as indicated on the individual connector descriptions. Replacement accessories may be ordered separately. See pages 12 through 15.

† MIL-C-22992 includes shell size 48, rated at 150 amperes. Consult your local Amphenol sales representative or Amphenol, Sidney, NY for availability.

# MIL-C-22992, Class L

## how to order

Connectors are supplied with removable contacts unassembled and applicable accessories as listed in the individual connector style descriptions, pages 8 through 11. Additional/replacement contacts or accessories may be ordered by their MS designations.

Connectors are ordered by MS designation. To illustrate the ordering procedure, part number MS90555 C32412SY is shown as follows:

PART NUMBER

|                |          |           |          |           |          |          |
|----------------|----------|-----------|----------|-----------|----------|----------|
| <u>MS90555</u> | <u>C</u> | <u>32</u> | <u>4</u> | <u>12</u> | <u>S</u> | <u>Y</u> |
| 1              | 2        | 3         | 4        | 5         | 6        | 7        |

### 1. MS Number -

MS90555 designates wall mount receptacle (*power source*)

MS90556 designates straight plug

MS90557 designates cable connecting receptacle without coupling ring

MS90558 designates wall mount plug with coupling ring (*equipment end*)

### 2. Shell Finish - C (conductive) for AC or N (nonconductive) for DC circuits.

Grounding Assemblies: Finish C

| Shell Size | Current Rating Amps | Shell Master Key/Keyway Position |          |             |             |             |             |             |
|------------|---------------------|----------------------------------|----------|-------------|-------------|-------------|-------------|-------------|
|            |                     | 60Hz & 400Hz                     |          |             |             |             |             |             |
|            |                     | 1 Phase                          |          |             | 3 Phase     |             |             |             |
|            |                     | 2 Wire                           |          | 3 Wire      | 3 Wire      | 4 Wire      |             |             |
|            |                     | 120 VAC                          | 240 VAC  | 120/240 VAC | 450/480 VAC | 120/208 VAC | 240/416 VAC | 277/480 VAC |
| 28         | 40                  | 4 (120°)                         | 5 (135°) | 4 (120°)    | ---         | 4 (120°)    | 5 (135°)    | 6 (150°)    |
| 32         | 60                  | 4 (120°)                         | 5 (135°) | 4 (120°)    | ---         | 4 (120°)    | 5 (135°)    | 6 (150°)    |
| 44         | 100                 | 4 (120°)                         | ---      | 4 (120°)    | 1 (60°)     | 4 (120°)    | 5 (135°)    | 6 (150°)    |
| 52         | 200                 | ---                              | ---      | 4 (120°)    | ---         | 4 (120°)    | 5 (135°)    | 6 (150°)    |

Non-grounding Assemblies: Finish N

| Shell Size | Current Rating Amps | Shell Master/Keyway Position |
|------------|---------------------|------------------------------|
|            |                     | DC                           |
|            |                     | 2 Wire                       |
|            |                     | 28 VDC                       |
| 28         | 40                  | N (105°)                     |
| 32         | 60                  | N (105°)                     |
| 44         | 100                 | N (105°)                     |
| 52         | 200                 | N (105°)                     |

### 3. Shell Size - related directly to current carrying capability.

Size 28 - 40 amperes

Size 32 - 60 amperes

Size 44 - 100 amperes

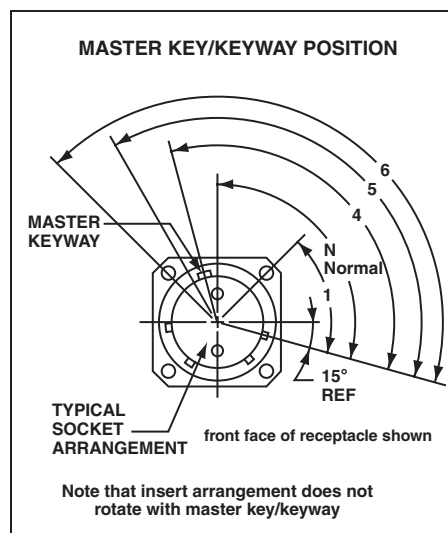
Size 52 - 200 amperes

### 4. Master Key/Keyway Position - N designates normal position. Positions 1, 4, 5 and 6 of the master key/keyway prevent cross-mating of incompatible voltages. Refer to the adjacent illustration.

### 5. Insert Arrangement - determined by connector size (current carrying capability) and cable configuration to be accommodated. Refer to pages 5 & 6.

### 6. Contact Type - P for pin, S for socket. MS90555 and MS90557 are supplied with socket contacts **only**. MS90556 and MS90558 are supplied with pin contacts **only**.

### 7. Alternate Insert Rotation - used to prevent cross-mating of incompatible frequencies. Absence of a letter in this space indicates normal (0°) position of the insert. Refer to page 7.

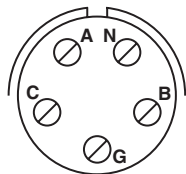


Amphenol Federal Vendor Identification  
FSCM77820

# MIL-C-22992, Class L

## contact arrangements

### Shell Size 28, 40 amp rating



28-12, 28-13  
Three phase AC, 4 wire, grounding

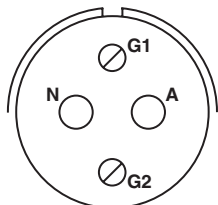
#### Cable:

|       |                                               |
|-------|-----------------------------------------------|
| 28-12 | IPCEA, type G, round, four #8 conductors      |
| 28-13 | CO-04 HDF, (4/6-4/12R) 1090<br>per MIL-C-3432 |

#### Contacts:

| Position | Size | Pin<br>M39029/48 | Socket<br>M39029/49 |
|----------|------|------------------|---------------------|
| A, B, C  | 6    | -317             | -329                |
| N, G     | 6N   | -318             | -329                |

### Shell Size 32, 60 amp rating



32-04, 32-05  
Single phase AC, 2 wire, grounding

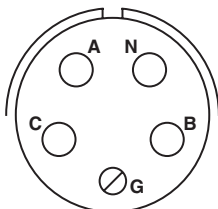
#### Cable:

|       |                                              |
|-------|----------------------------------------------|
| 32-04 | IPCEA, type G, round, two #6 conductors      |
| 32-05 | CO-02 HDF, (2/4-2/8R) 1100<br>per MIL-C-3432 |

#### Contacts:

| Position | Size | Pin<br>M39029/48 | Socket<br>M39029/49 |
|----------|------|------------------|---------------------|
| A        | 4    | -320             | -331                |
| N        | 4N   | -321             | -331                |
| G1, G2   | 6N   | -318             | -329                |

### Shell Size 32, 60 amp rating



32-12, 32-13  
Three phase AC, 4 wire, grounding

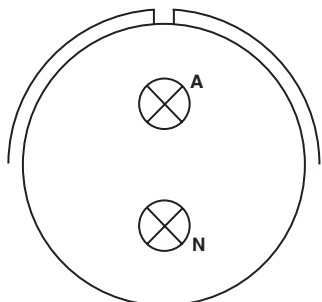
#### Cable:

|       |                                               |
|-------|-----------------------------------------------|
| 32-12 | IPCEA, type G, round, four #6 conductors      |
| 32-13 | CO-04 HDF, (4/4-4/12R) 1290<br>per MIL-C-3432 |

#### Contacts:

| Position | Size | Pin<br>M39029/48 | Socket<br>M39029/49 |
|----------|------|------------------|---------------------|
| A, B, C  | 4    | -320             | -331                |
| N        | 4N   | -321             | -331                |
| G        | 6N   | -318             | -329                |

### Shell Size 44, 100 amp rating



44-02, 44-03  
28 Volts DC, 2 wire

#### Cable:

|       |                                         |
|-------|-----------------------------------------|
| 44-02 | IPCEA, type W, round, two #2 conductors |
| 44-03 | CO-02 HDF, (2/1) 1385<br>per MIL-C-3432 |

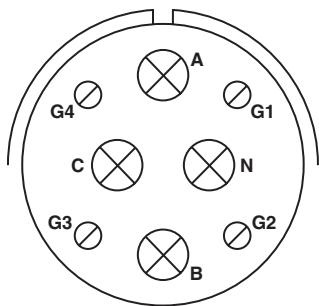
#### Contacts:

| Position | Size   | Pin<br>M39029/48 | Socket<br>M39029/49 |
|----------|--------|------------------|---------------------|
| A        | 1/0-1  | -323             | -333                |
| N        | 1/0N-1 | -324             | -333                |

# MIL-C-22992, Class L

## contact arrangements

### Shell Size 44, 100 amp rating



44-12, 44-13  
Three phase AC, 4 wire, grounding

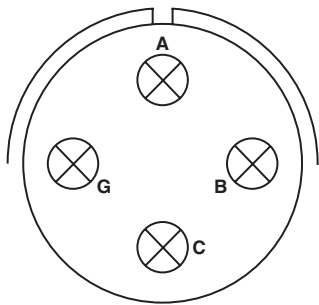
#### Cable:

|       |                                              |
|-------|----------------------------------------------|
| 44-12 | IPCEA, type G, round, four #2 conductors     |
| 44-13 | CO-04 HDF, (4/1-4/8R) 1620<br>per MIL-C-3432 |

#### Contacts:

| Position       | Size   | Pin<br>M39029/48 | Socket<br>M39029/49 |
|----------------|--------|------------------|---------------------|
| A, B, C        | 1/0-1  | -323             | -333                |
| N              | 1/0N-1 | -324             | -333                |
| G1, G2, G3, G4 | 6G     | -319             | -330                |

### Shell Size 44, 100 amp rating For Navy Ground Support Equipment use only.



44-50, 44-51, 44-52, 44-56  
Three phase AC, 3 wire, grounding

|       |                                                              |
|-------|--------------------------------------------------------------|
| 44-50 | Available in MS90555 & MS90558 only<br>4 each # 1 conductors |
|-------|--------------------------------------------------------------|

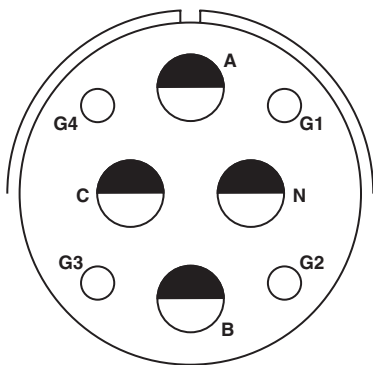
#### Cable:

|       |                                                                                  |
|-------|----------------------------------------------------------------------------------|
| 44-51 | Available in MS90556 & MS90557 only<br>IPCEA, type W, round, four # 1 conductors |
| 44-52 | Available in MS90556 only<br>IPCEA, type W, round, four # 2 conductors           |
| 44-56 | Available in MS90556 only<br>IPCEA, type W, round, four # 6 conductors           |

#### Contacts:

| Position | Size   | Pin<br>M39029/48 | Socket<br>M39029/49 |
|----------|--------|------------------|---------------------|
| A, B, C  | 1/0-1  | -323             | -333                |
| G        | 1/0N-1 | -324             | -333                |

### Shell Size 52, 200 amp rating



52-12, 52-13  
Three phase AC, 4 wire, grounding

#### Cable:

|       |                                                 |
|-------|-------------------------------------------------|
| 52-12 | IPCEA, type G, round, four #4/0 conductors      |
| 52-13 | CO-04 HDE, (4/0000-4/4R) 2380<br>per MIL-C-3432 |

#### Contacts:

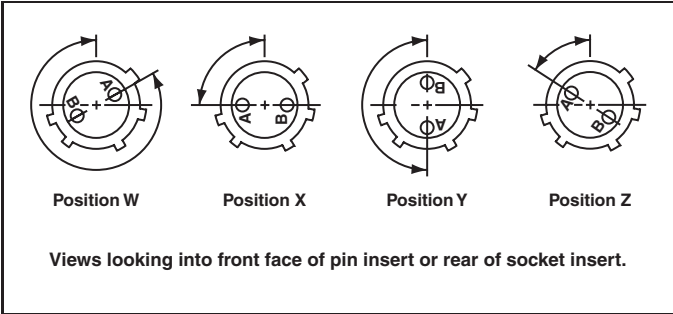
| Position       | Size | Pin<br>M39029/48 | Socket<br>M39029/49 |
|----------------|------|------------------|---------------------|
| A, B, C        | 4/0  | -327             | -335                |
| N              | 4/0N | -328             | -335                |
| G1, G2, G3, G4 | 4G   | -322             | -332                |

# MIL-C-22992, Class L

## alternate insert rotations

To avoid cross-plugging problems in applications requiring the use of more than one connector of the same size and arrangement, alternate insert rotations are available as indicated in the accompanying chart.

As shown in the diagram below, the front face of the pin insert is rotated within the shell in a clockwise direction from the normal shell key. The socket insert would be rotated counterclockwise the same number of degrees in respect to the normal shell key.

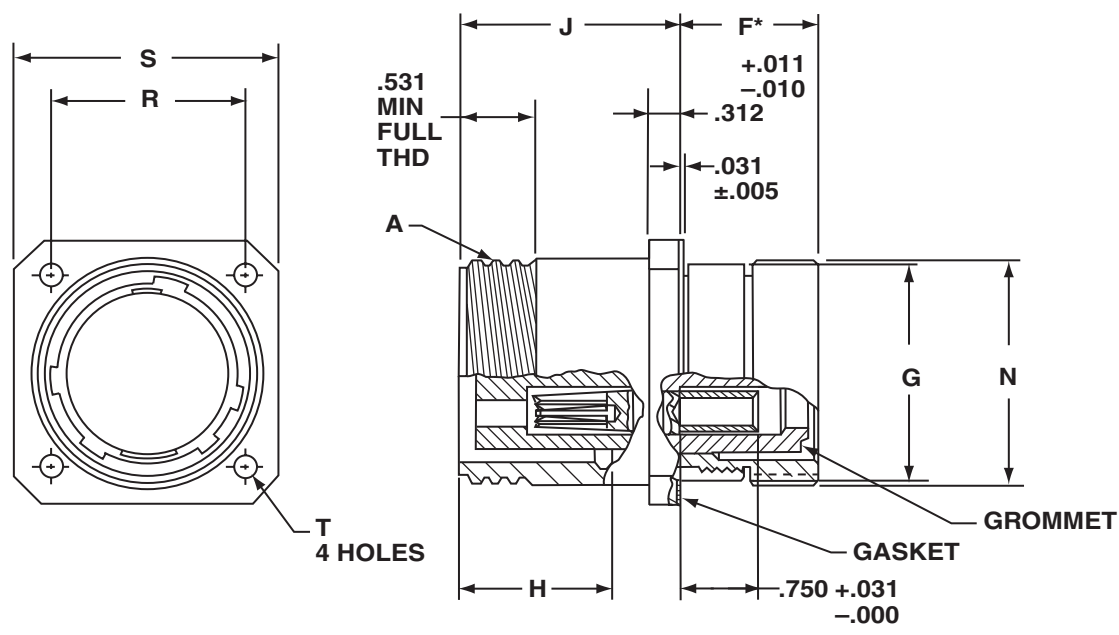


| Insert Arrangements | Keying Position<br>(degrees from normal position) |        |    |     |    |
|---------------------|---------------------------------------------------|--------|----|-----|----|
|                     | DC or 60 Hz<br>Normal                             | 400 Hz |    |     |    |
|                     |                                                   | W      | X  | Y   | Z  |
| 28-12               | 0                                                 | —      | —  | 180 | —  |
| 28-13               | 0                                                 | —      | —  | 180 | —  |
| 32-04               | 0                                                 | —      | 90 | —   | —  |
| 32-05               | 0                                                 | —      | 90 | —   | —  |
| 32-12               | 0                                                 | —      | —  | 180 | —  |
| 32-13               | 0                                                 | —      | —  | 180 | —  |
| 44-12               | 0                                                 | —      | —  | —   | 60 |
| 44-13               | 0                                                 | —      | —  | —   | 60 |
| 44-50               | 0                                                 | —      | —  | —   | —  |
| 44-51               | 0                                                 | —      | —  | —   | —  |
| 44-52               | 0                                                 | —      | —  | —   | —  |
| 44-56               | 0                                                 | —      | —  | —   | —  |
| 52-12               | 0                                                 | 300    | —  | —   | —  |
| 52-13               | 0                                                 | 300    | —  | —   | —  |

# MIL-C-22992, Class L

## MS90555

wall mount receptacle (*power source*)



All dimensions for reference only.

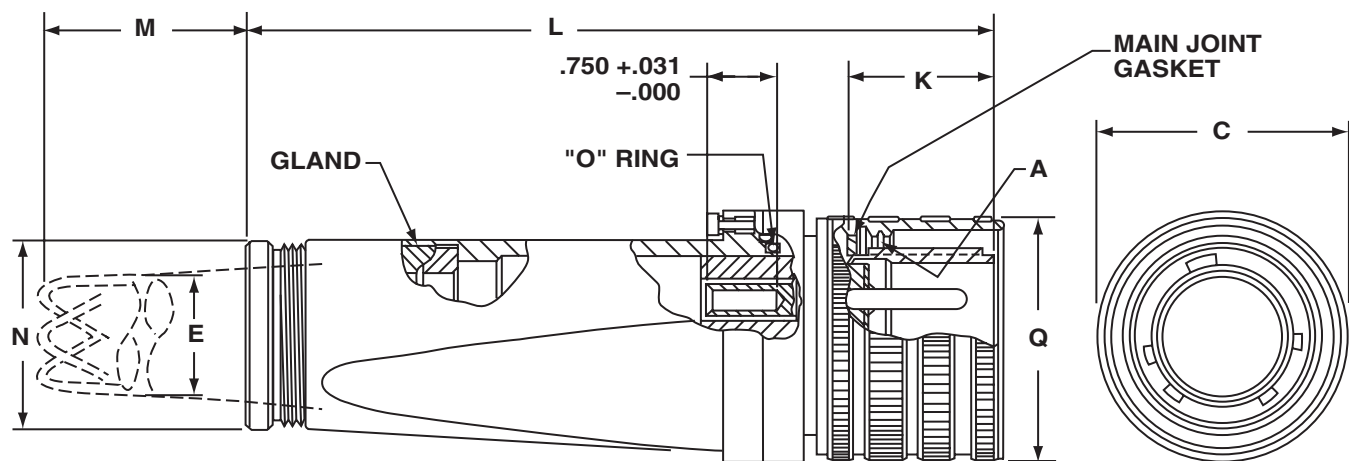
| Shell Size | A Thread<br>Class 2A<br>.1428P-.2857L<br>Double Stub | F*<br>±.031 | G Dia.<br>+.006<br>-.010 | H<br>±.005 | J<br>+.016<br>-.000 | N Dia.<br>+.011<br>-.020 | R<br>(BSC) | S<br>+.021<br>-.020 | T Dia.<br>±.005 |
|------------|------------------------------------------------------|-------------|--------------------------|------------|---------------------|--------------------------|------------|---------------------|-----------------|
| 28         | 2.000                                                | 1.376       | 1.938                    | 1.514      | 2.188               | 2.000                    | 1.844      | 2.375               | .177            |
| 32         | 2.250                                                | 1.376       | 2.188                    | 1.514      | 2.188               | 2.250                    | 2.062      | 2.625               | .209            |
| 44         | 3.000                                                | 1.438       | 3.062                    | 1.733      | 2.532               | 3.125                    | 2.812      | 3.375               | .281            |
| 52         | 3.500                                                | 1.438       | 3.562                    | 1.733      | 2.532               | 3.625                    | 3.156      | 3.875               | .281            |

To complete MS Part number see how to order, pg. 4.  
 Protective cover MS90563 is supplied as part of this connector assembly. Refer to page 15 for dimensions.  
 \*F dimension applies only when rear nut is fully tightened

# MIL-C-22992, Class L

## MS90556

### straight plug



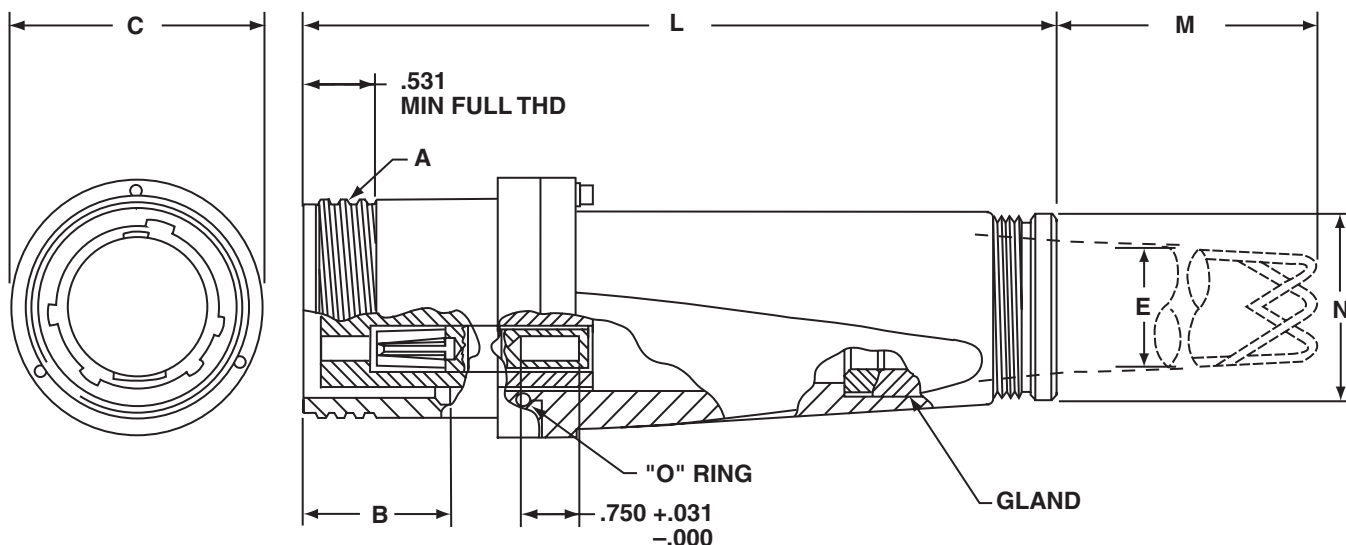
All dimensions for reference only.

| Shell Size and Arrangement | A Thread Class 2B .1428P-.2857L Double Stub | C Dia. Max | E Cable Range | K ±.005 | L Max Free Length | M Approx. Free Length | N Dia +.011 - .020 | Q Dia. Max |
|----------------------------|---------------------------------------------|------------|---------------|---------|-------------------|-----------------------|--------------------|------------|
| 28-12                      | 2.000                                       | 2.439      | 1.047-.922    | 1.557   | 8.188             | 7.188                 | 2.000              | 2.312      |
| 28-13                      |                                             |            | 1.130-1.005   |         |                   | 7.188                 |                    |            |
| 32-04                      | 2.250                                       | 2.689      | .969-.844     | 1.557   | 8.188             | 7.188                 | 2.000              | 2.562      |
| 32-05, -12                 |                                             |            | 1.130-1.005   |         |                   | 7.188                 |                    |            |
| 32-13                      |                                             |            | 1.342-1.217   |         |                   | 8.688                 |                    |            |
| 44-02                      | 3.000                                       | 3.667      | 1.312-1.187   | 1.776   | 10.172            | 10.688                | 2.500              | 3.531      |
| 44-03                      |                                             |            | 1.438-1.313   |         |                   | 9.688                 |                    |            |
| 44-12                      |                                             |            | 1.516-1.391   |         |                   | 10.688                |                    |            |
| 44-13                      |                                             |            | 1.672-1.547   |         |                   | 12.688                |                    |            |
| 44-51                      | 3.000                                       | 3.667      | 1.734-1.609   | 1.776   | 10.172            | 11.688                | 2.500              | 3.531      |
| 44-52                      |                                             |            | 1.525-1.435   |         |                   | 11.188                |                    |            |
| 44-56                      |                                             |            | 1.135-1.065   |         |                   | 7.188                 |                    |            |
| 52-12                      | 3.500                                       | 4.167      | 2.328-2.183   | 1.776   | 11.109            | 17.188                | 3.250              | 4.016      |
| 52-13                      |                                             |            | 2.453-2.308   |         |                   | 18.188                |                    |            |

To complete MS Part number see how to order, pg. 4.  
 Protective cover MS90564 is supplied as part of this connector assembly. Refer to page 15 for dimensions.  
 Contact brushings MS3348 are supplied as part of connector as required. Refer to page 13 for dimensions.

# MIL-C-22992, Class L MS90557

cable connecting receptacle *without coupling ring*



All dimensions for reference only.

| Shell Size and Arrangement | A Thread Class 2A .1428P-.2857L Double Stub | B $\pm .005$ | C Dia. Max. | E Cable Range | L Max Free Length | M Approx. Free Length | N Dia $+.011$ $-.020$ |
|----------------------------|---------------------------------------------|--------------|-------------|---------------|-------------------|-----------------------|-----------------------|
| 28-12                      | 2.000                                       | 1.514        | 2.439       | 1.047-.922    | 8.156             | 7.188                 | 2.000                 |
| 28-13                      |                                             |              |             | 1.130-1.005   |                   | 7.188                 |                       |
| 32-04                      | 2.250                                       | 1.514        | 2.689       | .969-.844     | 8.156             | 7.188                 | 2.000                 |
| 32-05, -12                 |                                             |              |             | 1.130-1.005   |                   | 7.188                 |                       |
| 32-13                      |                                             |              |             | 1.342-1.217   |                   | 8.688                 |                       |
| 44-02                      | 3.000                                       | 1.733        | 3.667       | 1.312-1.187   | 10.125            | 10.688                | 2.500                 |
| 44-03                      |                                             |              |             | 1.438-1.313   |                   | 9.688                 |                       |
| 44-12                      |                                             |              |             | 1.516-1.391   |                   | 10.688                |                       |
| 44-13                      |                                             |              |             | 1.672-1.547   |                   | 12.688                |                       |
| 44-51                      |                                             |              |             | 1.734-1.609   |                   | 11.688                |                       |
| 52-12                      | 3.500                                       | 1.733        | 4.167       | 2.328-2.183   | 11.062            | 17.188                | 3.250                 |
| 52-13                      |                                             |              |             | 2.453-2.308   |                   | 18.188                |                       |

To complete MS Part number see how to order, pg. 4.

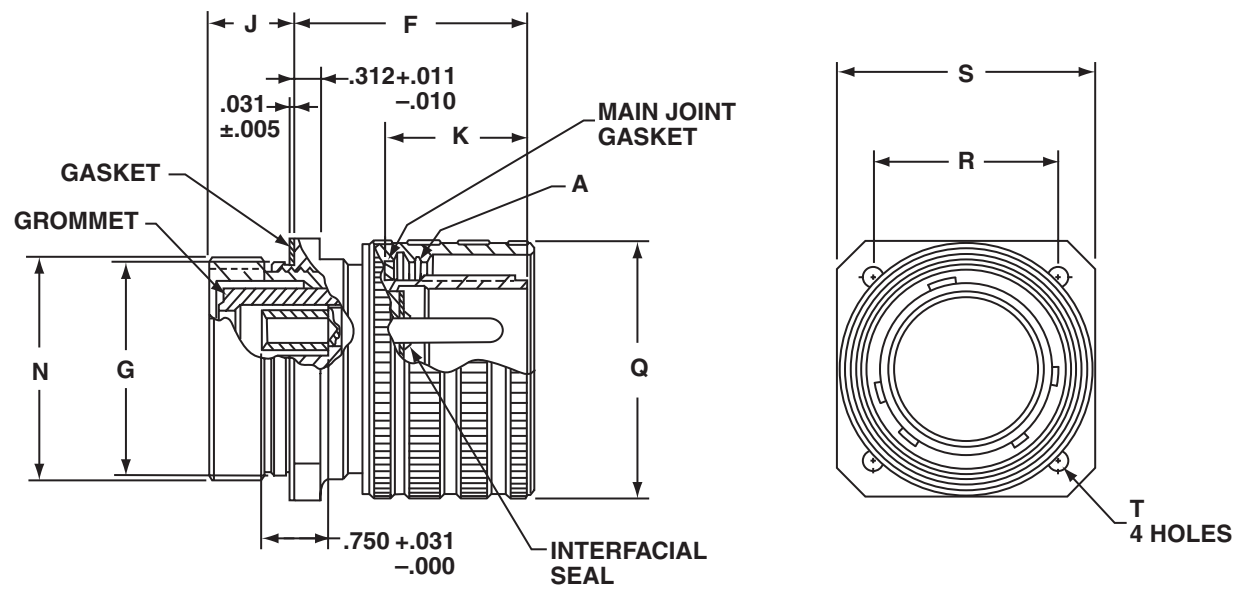
Protective cover MS90563 is supplied as part of this connector assembly. Refer to page 15 for dimensions.

Contact bushings MS3348 are supplied as part of connector as required. Refer to page 13 for dimensions.

# MIL-C-22992, Class L

## MS90558

wall mount plug with coupling ring *(equipment end)*



All dimensions for reference only.

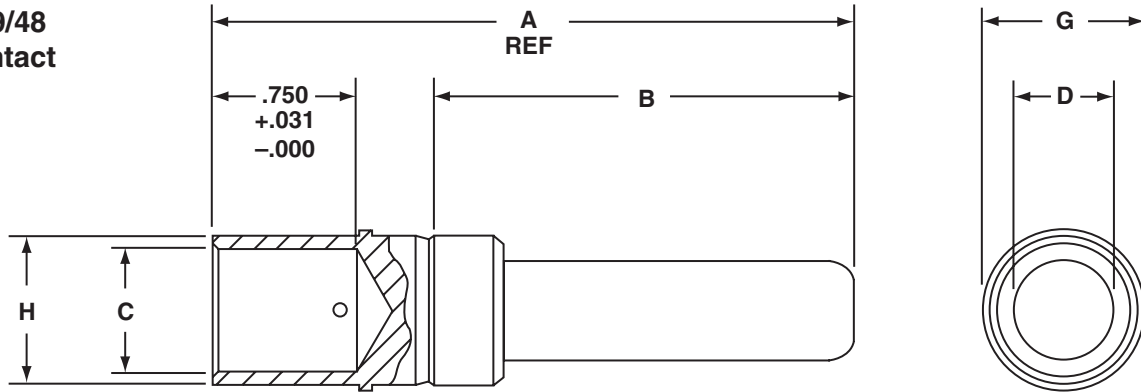
| Shell Size | A Thread<br>Class 2B<br>.1428P-.2857L<br>Double Stub | J<br>±.031 | G Dia<br>+.006<br>-.010 | F*<br>+.016<br>-.000 | K<br>±.005 | N<br>+.011<br>-.020 | Q<br>Dia.<br>Max | R<br>(BSC) | S<br>+.021<br>-.020 | T<br>Dia.<br>±.005 |
|------------|------------------------------------------------------|------------|-------------------------|----------------------|------------|---------------------|------------------|------------|---------------------|--------------------|
| 28         | 2.000                                                | .959       | 1.938                   | 2.639                | 1.557      | 2.000               | 2.312            | 1.844      | 2.375               | .177               |
| 32         | 2.250                                                | .959       | 2.188                   | 2.639                | 1.557      | 2.250               | 2.562            | 2.062      | 2.625               | .209               |
| 44         | 3.000                                                | 1.021      | 3.062                   | 2.998                | 1.776      | 3.125               | 3.531            | 2.812      | 3.375               | .281               |
| 52         | 3.500                                                | 1.021      | 3.562                   | 2.998                | 1.776      | 3.625               | 4.016            | 3.156      | 3.875               | .281               |

To complete MS part number see how to order, pg. 4.  
 Protective cover MS90564 is supplied as part of this connector assembly. Refer to page 15 for dimensions.  
 \* F dimension applies only when rear nut is fully tightened.

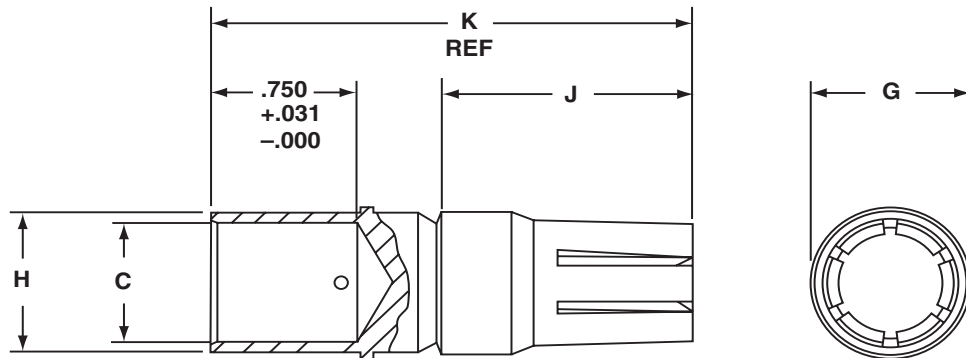
# MIL-C-22992, Class L Accessories

## contacts

**M39029/48  
pin contact**



**M39029/49  
socket contact**



All dimensions for reference only.

| Socket MS Part Number* | Pin MS Part Number | Contact Size | Wire Well Size | A Ref. | B $\pm$ .005 | C Dia $\pm$ .001         | D Dia $\pm$ .001 | G Dia           | H Dia                    | J $\pm$ .005 | K Ref |
|------------------------|--------------------|--------------|----------------|--------|--------------|--------------------------|------------------|-----------------|--------------------------|--------------|-------|
| M39029/49-335          | M39029/48-327      | 4/0          | 4/0            | 3.207  | 2.097        | .641 $\pm$ .004 $-$ .003 | .500             | .781 $\pm$ .003 | .750 $\pm$ .004 $-$ .003 | 1.283        | 2.393 |
| ---                    | M39029/48-328      | 4/0N         | 4/0            | 3.325  | 2.215        | .641 $\pm$ .004 $-$ .003 | .500             | .781 $\pm$ .003 | .750 $\pm$ .004 $-$ .003 | ---          | ---   |
| M39029/49-333          | M39029/48-323      | 1/0          | 1              | 3.207  | 2.097        | .406 $\pm$ .004 $-$ .003 | .357             | .609 $\pm$ .003 | .506 $\pm$ .004 $-$ .003 | 1.283        | 2.393 |
| ---                    | M39029/48-324      | 1/0N         | 1              | 3.325  | 2.215        | .406 $\pm$ .004 $-$ .003 | .357             | .609 $\pm$ .003 | .506 $\pm$ .004 $-$ .003 | ---          | ---   |
| M39029/49-331          | M39029/48-320      | 4            | 4              | 2.786  | 1.738        | .281 $\pm$ .002          | .225             | .417 $\pm$ .002 | .374 $\pm$ .002          | 1.158        | 2.206 |
| ---                    | M39029/48-321      | 4N           | 4              | 2.904  | 1.856        | .281 $\pm$ .002          | .225             | .417 $\pm$ .002 | .374 $\pm$ .002          | ---          | ---   |
| M39029/49-329          | M39029/48-317      | 6            | 6              | 2.786  | 1.738        | .234 $\pm$ .002          | .178             | .342 $\pm$ .002 | .312 $\pm$ .002          | 1/158        | 2.206 |
| ---                    | M39029/48-318      | 6N           | 6              | 2.904  | 1.856        | .234 $\pm$ .002          | .178             | .342 $\pm$ .002 | .312 $\pm$ .002          | ---          | ---   |
| M39029/49-332          | M39029/48-322      | 4G           | 4              | 2.856  | 1.746        | .281 $\pm$ .002          | .225             | .417 $\pm$ .002 | .374 $\pm$ .002          | 1.752        | 2.862 |
| M39029/49-330          | M39029/48-319      | 6G           | 6              | 2.856  | 1.746        | .234 $\pm$ .002          | .178             | .342 $\pm$ .002 | .312 $\pm$ .002          | 1.752        | 2.862 |

\*Order by MS part number listed for either socket or pin.

# MIL-C-22992, Class L Accessories

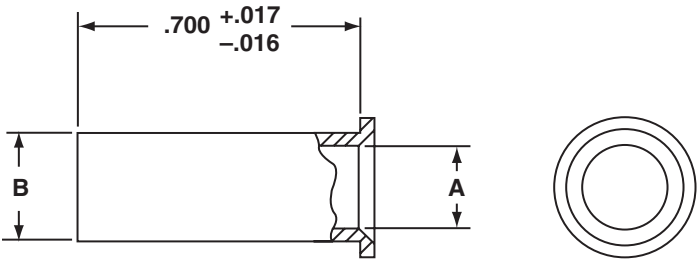
## contact bushing/removal tool

### MS3348 contact bushing

All dimensions for reference only.

| MS Part Number* | Contact Wire Barrel Size (Ref) | Wire Size (Ref) | A Dia<br>+.010<br>-.003 | B Dia<br>+.002<br>-.003 |
|-----------------|--------------------------------|-----------------|-------------------------|-------------------------|
| MS3348-1 - 2L   | 1                              | 2               | .359                    | .396                    |
| MS3348-4 - 5L   | 4                              | 5               | .250                    | .272                    |
| MS3348-4 - 6L   | 4                              | 6               | .225                    | .272                    |
| MS3348-6 - 8L   | 6                              | 8               | .185                    | .225                    |
| MS3348-6 - 9L   | 6                              | 9               | .155                    | .225                    |
| MS3348-1 - 6L   | 1                              | 6               | .225                    | .396                    |
| MS3348-4 - 8L   | 4                              | 8               | .185                    | .272                    |
| MS3348-6 -10L   | 6                              | 10              | .136                    | .225                    |
| MS3348-4/0-2/0L | 4/0                            | 2/0             | .500                    | .629                    |

\* Order by MS part number listed.

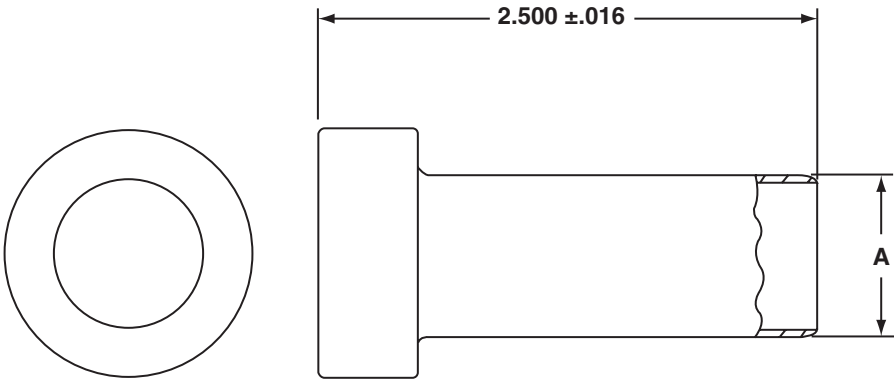


### MS90562 contact removal tool

All dimensions for reference only.

| MS Part Number* | Contact Size | A Dia<br>+.000<br>-.002 |
|-----------------|--------------|-------------------------|
| MS90562-1       | 4/0          | .790                    |
| MS90562-2       | 2/0          | .696                    |
| MS90562-3       | 1/0          | .558                    |
| MS90562-4       | 2            | .462                    |
| MS90562-5       | 4            | .376                    |
| MS90562-6       | 6            | .354                    |

\* Order by MS part number listed.



# MIL-C-22992, Class L Accessories

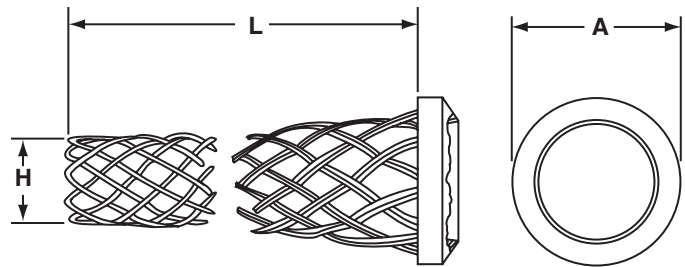
## cable strain relief/cable sealing gland

### MS90561 cable strain relief

All dimensions for reference only.

| MS<br>Part<br>Number* | Arrange-<br>ment<br>Number | A<br>Dia<br>+.000<br>-.010 | H<br>Dia<br>Cable Range |       | L<br>Approx. |
|-----------------------|----------------------------|----------------------------|-------------------------|-------|--------------|
|                       |                            |                            | Max                     | Min   |              |
| MS90561-2             | 28-13,<br>32-12            | 1.797                      | 1.145                   | 1.003 | 8.000        |
| MS90561-4             | 28-02, -04                 | 1.797                      | .844                    | .688  | 7.500        |
| MS90561-12            | 28-12                      | 1.797                      | 1.047                   | .891  | 8.000        |
| MS90561-13            | 32-13                      | 1.797                      | 1.342                   | 1.185 | 9.500        |
| MS90561-15            | 44-12                      | 2.235                      | 1.516                   | 1.360 | 11.500       |
| MS90561-16            | 44-13                      | 2.235                      | 1.688                   | 1.531 | 13.500       |
| MS90561-17            | 52-12                      | 2.922                      | 2.328                   | 2.039 | 18.000       |
| MS90561-18            | 52-13                      | 2.922                      | 2.500                   | 2.211 | 19.000       |
| MS90561-19            | 44-51                      | 2.235                      | 1.750                   | 1.550 | 12.500       |
| MS90561-20            | 44-52                      | 2.235                      | 1.578                   | 1.375 | 12.000       |
| MS90561-21            | 44-56                      | 2.235                      | 1.160                   | 1.010 | 8.000        |

\* Order by MS part number listed.



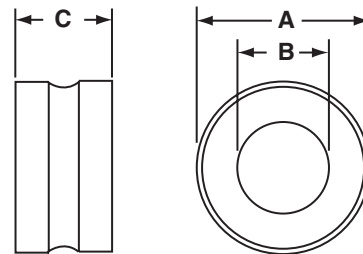
### MS23747 cable sealing gland

All dimensions for reference only.

| MS<br>Part<br>Number* | Arrange-<br>ment<br>Number | A<br>Dia<br>+.000<br>-.020 | B<br>Dia<br>+.020<br>-.000 | C<br>±.010 | Min<br>Cable<br>Dia<br>Ref. |
|-----------------------|----------------------------|----------------------------|----------------------------|------------|-----------------------------|
|                       |                            |                            |                            |            |                             |
| MS23747-2             | 28-13,<br>32-05, -12       | 1.805                      | 1.130                      | 1.034      | 1.005                       |
| MS23747-12            | 28-12                      | 1.805                      | 1.047                      | 1.034      | .922                        |
| MS23747-13            | 32-13                      | 1.805                      | 1.342                      | 1.034      | 1.217                       |
| MS23747-14            | 44-03                      | 2.242                      | 1.438                      | 1.160      | 1.313                       |
| MS23747-15            | 44-12                      | 2.242                      | 1.516                      | 1.160      | 1.391                       |
| MS23747-16            | 44-13                      | 2.242                      | 1.672                      | 1.160      | 1.547                       |
| MS23747-18            | 52-12                      | 2.927                      | 2.328                      | 1.284      | 2.183                       |
| MS23747-19            | 52-13                      | 2.927                      | 2.453                      | 1.284      | 2.308                       |
| MS23747-20            | 44-51                      | 2.242                      | 1.734                      | 1.160      | 1.609                       |
| MS23747-21            | 44-52                      | 2.242                      | 1.562                      | 1.160      | 1.437                       |
| MS23747-22            | 44-56                      | 2.242                      | 1.150                      | 1.160      | 1.025                       |

\* Order by MS part number listed.

This gland must be used with MS90561 strain relief.



# MIL-C-22992, Class L Accessories

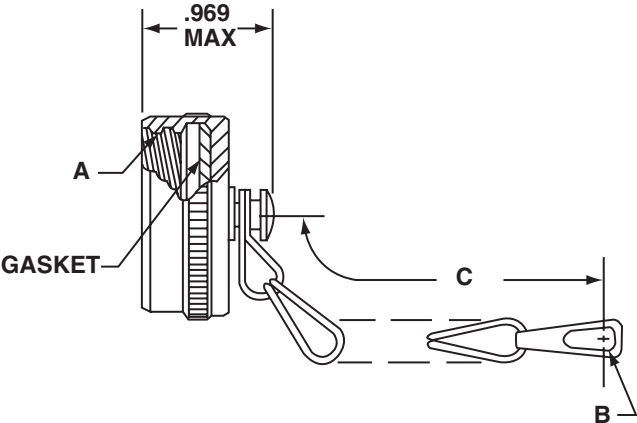
## protective covers

### MS90563 protective covers used with: MS90555 wall mount receptacle MS90557 cable connecting receptacle

All dimensions for reference only.

| MS Part Number* | Use with Shell Size | A Thread Class 2B .1428P-.2857L Double Stub | B Dia Ref   |             | C Approx. |
|-----------------|---------------------|---------------------------------------------|-------------|-------------|-----------|
|                 |                     |                                             | For MS90555 | For MS90557 |           |
| MS90563-1( )    | 28                  | 2.000                                       | .177        | .177        | 6.000     |
| MS90563-3( )    | 32                  | 2.250                                       | .209        | —           | 4.500     |
| MS90563-4( )    | 32                  | 2.250                                       | —           | .177        | 6.000     |
| MS90563-7( )    | 44                  | 3.000                                       | .281        | .281        | 7.500     |
| MS90563-11( )   | 52                  | 3.500                                       | .281        | .281        | 7.500     |

\* To complete MS part number, add letter C (Conductive) for AC or N (Non-conductive) for DC connector assemblies.

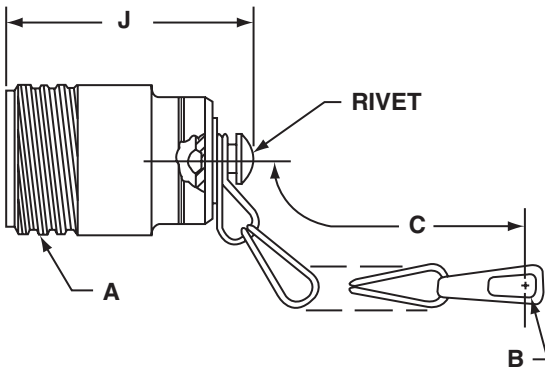


### MS90564 protective covers used with: MS90556 straight plug MS90558 wall mount plug

All dimensions for reference only.

| MS Part Number* | Use with Shell Size | A Thread Class 2A (Plated) .1428P-.2857L Double Stub | B Dia Ref   |             | C Approx. | J Max |
|-----------------|---------------------|------------------------------------------------------|-------------|-------------|-----------|-------|
|                 |                     |                                                      | For MS90556 | For MS90558 |           |       |
| MS90564-1( )    | 28                  | 2.000                                                | .177        | .177        | 7.500     | 2.266 |
| MS90564-3( )    | 32                  | 2.250                                                | —           | .209        | 6.000     | 2.266 |
| MS90564-4( )    | 32                  | 2.250                                                | .177        | —           | 7.500     | 2.266 |
| MS90564-7( )    | 44                  | 3.000                                                | .281        | .281        | 8.500     | 2.484 |
| MS90564-11( )   | 52                  | 3.500                                                | .281        | .281        | 8.500     | 2.484 |

\* To complete MS part number, add letter C (Conductive) for AC or N (Non-conductive) for DC connector assemblies.



# MIL-C-22992, Class L

## installation instructions

Complete installation instructions (L-1014) for Class L connectors are available on request. Reproduced below are condensed assembly instructions to familiarize the user with the installation procedure and tooling required.

### Cable Preparation (MS90556 and MS90557 connectors only)

The following table shows the standard wire color coding, generator terminal markings, and connector contact identification used with Class L connectors.

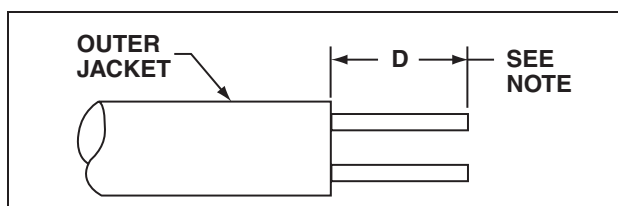
**Standardized Generator Wiring and Connections**

| Generator Terminal Marking | Current | Contact Designation | Conductor Circuit | Wire Color                      |
|----------------------------|---------|---------------------|-------------------|---------------------------------|
| + (POS)                    | 28Vdc   | A                   | Positive          | Black                           |
| – (NEG) ground             | 28Vdc   | N                   | Negative          | White                           |
| L <sub>1</sub>             | AC      | A                   | Phase A           | Black                           |
| L <sub>2</sub>             | AC      | B                   | Phase B           | Red                             |
| L <sub>3</sub>             | AC      | C                   | Phase C           | Blue (Commercial may be orange) |
| L <sub>0</sub>             | AC      | N                   | Neutral           | White                           |
| G (or Gnd)                 | AC      | G                   | Safety grounding  | Green (Commercial may be bare)  |

**Step 1)** Determine cable lay to facilitate alignment of contacts and insert holes without wire crossing.

**Step 2)** Strip cable jacket to dimension shown. Avoid cutting or nicking individual conductor insulation.

| Connector Size | D Inches Approx. |
|----------------|------------------|
| 28             | 3.000            |
| 32             | 3.000            |
| 44             | 4.250            |
| 52             | 5.000            |



**Note**

Some insert arrangements require that two or more ground wires be terminated into one contact. Dimension D must therefore be increased to permit routing these wires around the larger conductors.

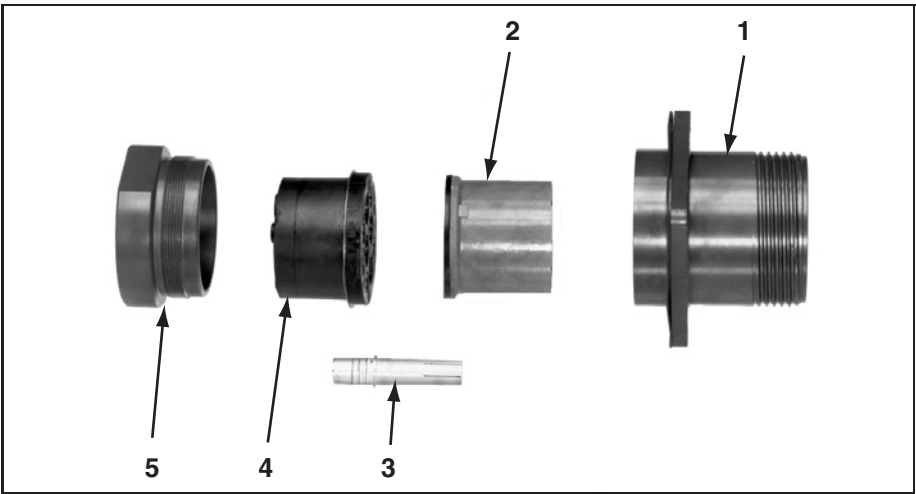
**Step 3)** Install connector components in the order shown in the applicable assembly view illustrated on pages 17 and 18.

**Step 4)** Strip insulation of individual conductors to 3/4 inch from end of conductor.

# MIL-C-22992, Class L

## installation instructions

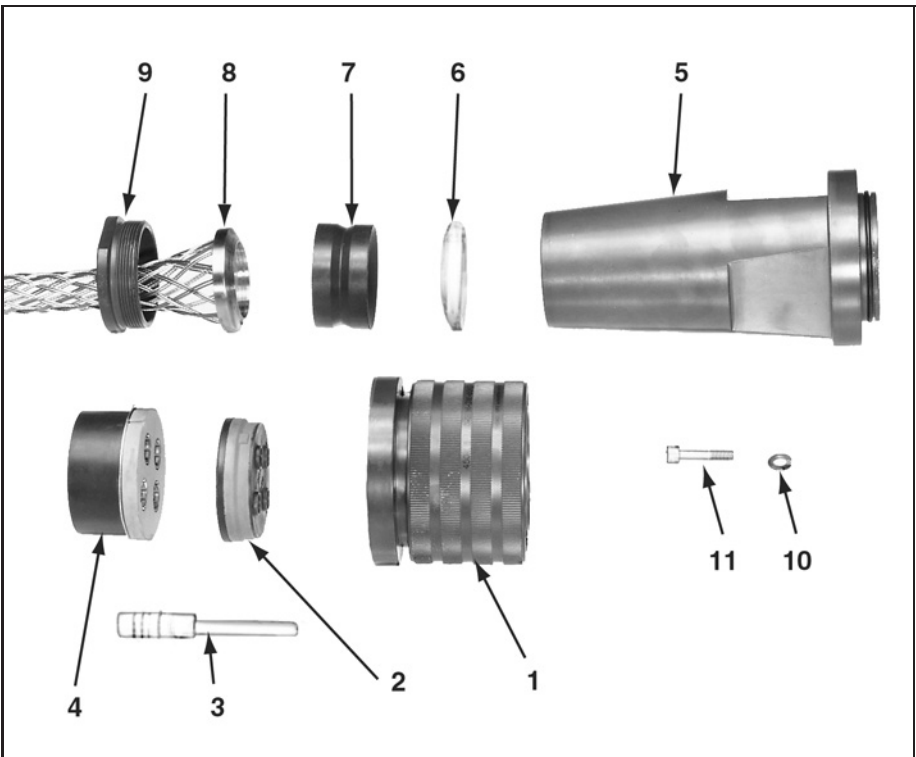
### MS90555 Connector



Wall Mount Receptacle Components:

1. Shell
2. Insert Assembly, Socket
3. Contact, Socket
4. Grommet Assembly, Socket
5. Nut, Retaining
6. Protective Cap Assembly (Not Shown)
7. Flange Gasket (Not Shown)

### MS90556 Connector



Straight Plug Components:

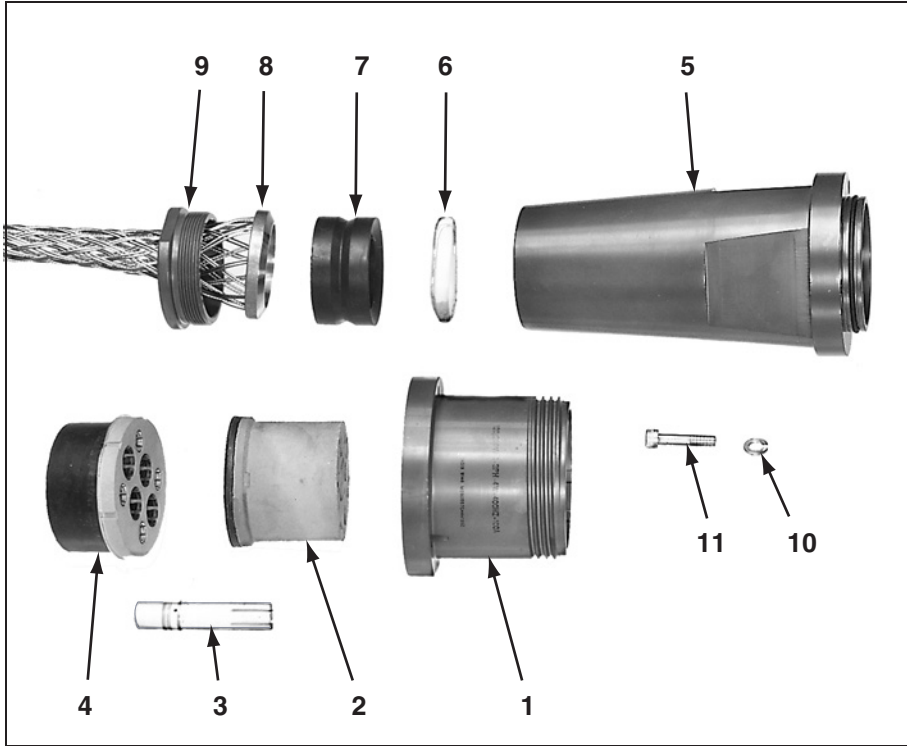
1. Shell and Coupling Nut Assembly
2. Insert Assembly, Pin
3. Contact, Pin
4. Spacer Assembly, Pin
5. Back Adapter
6. Gland Washer
7. Gland
8. Cable Grip
9. Gland Nut
10. Lockwasher (3 each)
11. Screw (3 each)
12. Protective Cap Assembly (Not Shown)

Note: On shell size 32 connectors, item #6 (Gland Washer) is contained within item #5 (Back Adapter).

# MIL-C-22992, Class L

## installation instructions

### MS90557 Connector

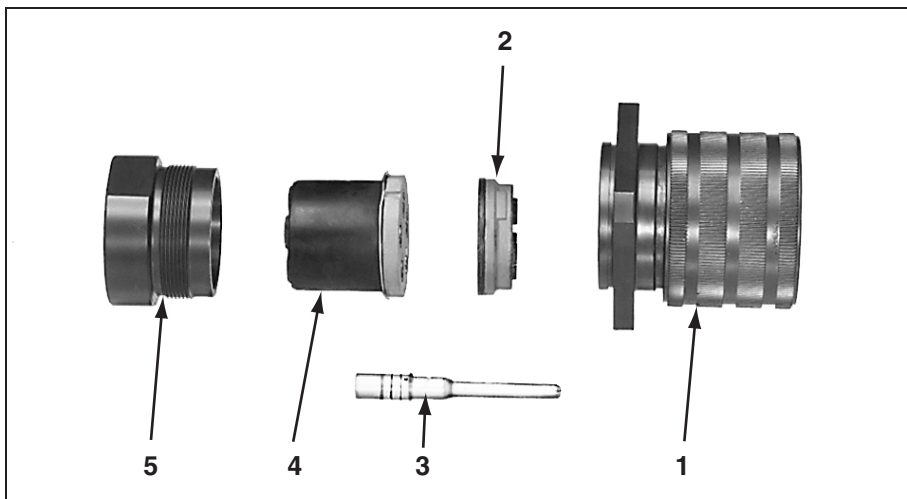


Cable Connecting Receptacle  
Components:

1. Shell
2. Insert Assembly, Socket
3. Contact, Socket
4. Spacer Assembly, Socket
5. Back Adapter
6. Gland Washer
7. Gland
8. Cable Grip
9. Gland Nut
10. Lockwasher (3 each)
11. Screw (3 each)
12. Protective Cap Assembly (Not shown)

Note: On shell size 32 connectors, item #6 (Gland Washer) is contained within item #5 (Back Adapter).

### MS90558 Connector



Wall Mount Plug Components:

1. Shell and Coupling Nut Assembly
2. Insert Assembly, Pin
3. Contact, Pin
4. Grommet Assembly, Pin
5. Nut, Retaining
6. Protective Cap Assembly (Not Shown)
7. Flange Gasket (Not Shown)

# MIL-C-22992, Class L

## installation instructions

### Contact Installation

**Step 1)** Insert stripped conductors in contact wirewells. If contact bushing is used, insert conductor in bushing and bushing in contact wirewell. If two or more ground wires are inserted into a single contact, make sure all wires are fully seated in wirewell.

**Step 2)** Select correct crimping tool, locator and die combination from the table for contacts to be installed. With conductor or contact bushing in place, insert contact into tool. Close crimping die fully to form a uniform crimp.

| Contact Part Number | Size | Type | Crimping Tool*                  | Locator* | Die*         | Removal Tool |
|---------------------|------|------|---------------------------------|----------|--------------|--------------|
| M39029/48-327       | 4/0  | P    | Pico Model                      | 4297-1   | 414DA-4/0N-1 | MS90562-1    |
| M39029/49-335       | 4/0  | S    | 400B or                         |          |              |              |
| M39029/48-328       | 4/0N | P    | 400B-1                          |          |              |              |
| M39029/48-323       | 1/0  | P    | Pico Model                      | 4297-3   | 414DA-1/0N   | MS90562-3    |
| M39029/49-333       | 1/0  | S    | 400B or                         |          |              |              |
| M39029/48-324       | 1/0N | P    | 400B-1                          |          |              |              |
| M39029/48-320       | 4    | P    | Pico Model<br>400B or<br>400B-1 | 4297-5   | 414DA-4N     | MS90562-5    |
| M39029/49-331       | 4    | S    |                                 |          |              |              |
| M39029/48-321       | 4N   | P    |                                 |          |              |              |
| M39029/48-322       | 4G   | P    |                                 |          |              |              |
| M39029/49-332       | 4G   | S    |                                 |          |              |              |
| M39029/48-317       | 6    | P    | Pico Model<br>400B or<br>400B-1 | 4297-6   | 414DA-6N     | MS90562-6    |
| M39029/49-329       | 6    | S    |                                 |          |              |              |
| M39029/48-318       | 6N   | P    |                                 |          |              |              |
| M39029/48-319       | 6G   | P    |                                 |          |              |              |
| M39029/49-330       | 6G   | S    |                                 |          |              |              |

\* Available from Pico Crimping Tools Co.,  
9832 Jersey Ave.  
Santa Fe Springs, CA 90670  
Phone: 805-388-5510

If crimping tools are available, contacts may be affixed to conductors by soldering. Use rosin-alcohol solder flux, a good grade of 60/40 solder and a 500 watt soldering iron or probe type resistance soldering equipment. Pre-tin conductors before soldering. Solder must not be present on shoulder or retention area of contact.

### Connector Assembly

**Step 1)** If inserts are not already positioned in the connector shell, align large tab on insert with large slot in shell and push insert in until it bottoms in shell.

**Step 2)** Apply a thin coating of Dow Corning DC-4 lubricant to the periphery of contact holes in spacer or grommet assembly. Push contacts into rear of spacer or grommet assembly until locked into contact retainer bushing.

**Step 3)** Align contacts with proper holes in insert. Small key of insert must be aligned with appropriate keyway in spacer or grommet assembly. Slide contacts into insert holes until spacer or grommet assembly butts against insert. A thin film of Dow Corning DC-4 lubricant applied to the periphery of insert contact holes will provide maximum sealing efficiency.

**Step 4)** Assemble accessories to connector. The back adapter "O" ring should have a very thin film of Dow Corning DC-4 lubricant applied. Outer surfaces only of gland should be lubricated with a thin film of UniTemp Grease EP. Avoid getting grease on inside surfaces of gland and on cable jacket.

**Step 5)** Tighten retaining nut or gland nut on shell or adapter. A metal-to-metal seating condition is desirable, but may not be attainable with maximum cable diameters.

### Contact Removal

**Step 1)** Loosen all rear accessories and slide back along cable.

**Step 2)** Remove spacer or grommet assembly with contacts from connector insert.

**Step 3)** Using the appropriate size contact removal tool, push tool over front of contact until it bottoms in spacer or grommet assembly hole. This will open contact retaining bushing and allow contact to be removed from the spacer or grommet assembly from the rear. When using jacketed cable, all contacts should be released from contact retention bushings before removal from spacer or grommet assembly is accomplished.