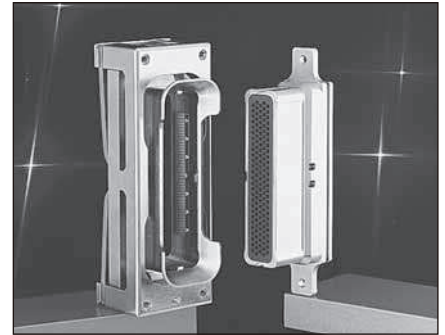


# Rectangular Robotic Connectors



In the frame of Space Station Alpha program, SOURIAU has developed and qualified a series of high reliability rectangular connector for robotic operations. This hardware is used on the SSRMS (Space Station Remote Manipulator System) which is the Canadian contribution to the Space Station. These connectors feature :

- Low Insertion Force contacts
- Thermal differential (between plug and receptacle) compatibility
- Integrated misalignment catching system
- High durability (6000 operations)
- High EMI shielding efficiency
- Associated dismountable EMI backshells
- Deep space environment (Atox) compatibility
- Easy inspection, maintenance or repair after wiring.



## Characteristics

### Performances

| Mechanical  |
|---|
| <b>Mass</b> <ul style="list-style-type: none"> <li>• &lt; 105 g for plug</li> <li>• &lt; 76 g for MSSP<sup>(1)</sup> receptacle</li> <li>• &lt; 218 g for ORU<sup>(2)</sup> receptacle</li> </ul>   |
| <b>ORU receptacle misalignment</b> <ul style="list-style-type: none"> <li>• <math>\Delta\alpha = \pm 0,5^\circ</math></li> <li>• <math>\Delta\beta = \pm 0,5^\circ</math></li> <li>• <math>\Delta\gamma = \pm 0,5^\circ</math></li> <li>• <math>\Delta Y = 1,27</math> mm</li> <li>• <math>\Delta Z = 2,03</math> mm</li> </ul> |
| <b>ORU receptacle overstroke</b> <ul style="list-style-type: none"> <li>• <math>\Delta X = 2,29</math> mm</li> </ul>  |

- (1) MSSP : Mobile Servicing System Payload  
 (2) ORU : Orbital Replacement Unit

| Electrical                            |
|---------------------------------------|
| Contact resistance as per MIL-C 39029 |

| Environmental conditions        |  |
|---------------------------------|--|
| Temperatures                    | Operational - 85°C to + 90°C               |
|                                 | Qualification - 101°C to + 106°C           |
|                                 | Non functional - 157°C to + 175°C          |
| Differential Mating temperature | Operational 125°C                          |
|                                 | Acceptance 135°C                           |
|                                 | Qualification 200°C                        |
| Pressure                        | 104,1 to 1,33.10 <sup>-11</sup> Kpa        |
| Vacuum                          | 10 <sup>-5</sup> to 10 <sup>-10</sup> Torr |
| Acceleration                    | ± 20 g                                     |

### Materials and finishes

|   | Material  | Finish   |
|---|---|--|
| Plug<br>MSSP Receptacle<br>ORU Receptacle | Aluminium alloy 7075  | Chemical nickel plating  |
| Compliance mechanism                      | <ul style="list-style-type: none"> <li>• Frame, flange &amp; beam</li> <li>• Helicoil &amp; axle</li> <li>• Spring</li> </ul> | Aluminium alloy 7075<br>Stainless steel<br>Beryllium copper<br>Thermal treatment |
| Insulator                                 | 3505 EPOXY  | -  |
| Backshell                                 | Aluminium alloy 7075  | Chemical nickel plating  |

### Mating/demating forces

| Shell size | Option | Contact arrangement                                  | Mating force (N) | Demating force (N) |
|------------|--------|--|------------------|--------------------|
| Large      | L1     | 137 # 22   | 101              | 78                 |
|            | L2     | 45 # 16  | 116              | 87                 |
|            | L3     | 22 # 12  | 112              | 85                 |
|            | L4     | 12 # 12, 12 # 20 & 46 # 22                           | 108              | 82                 |
|            | L5     | 12 # 12, 12 # 20 & 46 # 22 + grounding of coax lines | 138              | 119                |
| Medium     | M1     | 72 # 22  | 53               | 43                 |
|            | M2     | 41 # 20  | 43               | 37                 |
|            | M3     | 6 # 12, 8 # 20 & 17 # 22                             | 52               | 42                 |



## Contact layouts

All arrangements are seen from male front view.

| Large         |        |              | Medium        |        |        |              |               |
|---------------|--------|--------------|---------------|--------|--------|--------------|---------------|
| Option        | Layout |              | Configuration | Option | Layout |              | Configuration |
|               | Nb     | contact size |               |        | Nb     | contact size |               |
| L1            | 137    | # 22         |               | M1     | 72     | # 22         |               |
| L2            | 45     | # 16         |               | M2     | 41     | # 20         |               |
| L3            | 22     | # 12         |               | M3     | 17     | # 22         |               |
|               |        |              |               |        | 8      | # 20         |               |
|               |        |              |               |        | 6      | # 12         |               |
| L4 and L6 (1) | 46     | # 22         |               |        |        |              |               |
|               | 12     | # 20         |               |        |        |              |               |
|               | 12     | # 12         |               |        |        |              |               |
| L5 and L7 (2) | 46     | # 22         |               |        |        |              |               |
|               | 12     | # 20         |               |        |        |              |               |
|               | 12     | # 12 coax    |               |        |        |              |               |

(1) Option 4 with Captive Hardware (+CH)

(2) Option 5 with Captive Hardware (+CH)

## Crimping, Insertion & Removal tools for contacts

| Contact size | Contact part number                          | Crimping tools | Positioner                       | Insertion and removal plastic tools |
|--------------|--|----------------|----------------------------------|-------------------------------------|
| # 22         | Pin<br>Socket                                | M22520/2-01    | 8976-700<br>M22520/2-07          | M81969/14-01                        |
| # 20         | Pin<br>Socket                                | M22520/1-01    | M22520/1-04                      | M81969/14-10                        |
| # 16         | Pin<br>Socket                                |                |                                  | M81969/14-03                        |
| # 12         | Pin<br>Socket                                |                |                                  | M81969/14-04                        |
| # 12 coax    | Inner pin<br>Inner socket<br>Crimping sleeve | M22520/5-01    | 8976-720<br>8976-710<br>8976-730 |                                     |

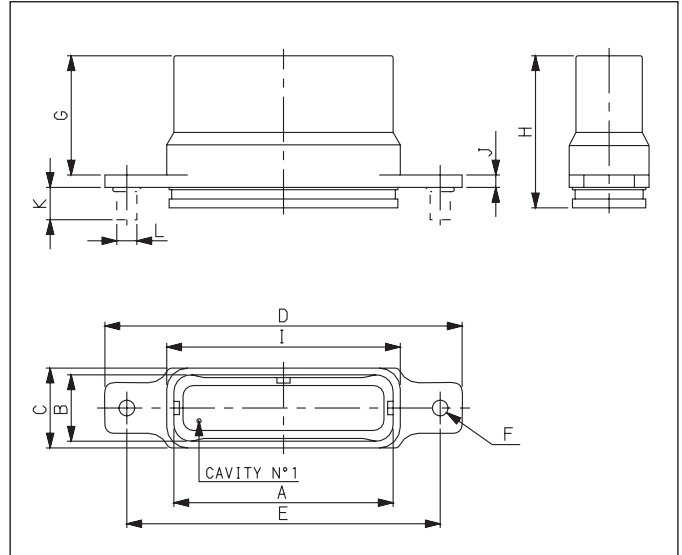


## Dimensions (in mm)

### Plug (Packed reference)

| Shell size  | Large    |          |          |          |          |
|-------------|----------|----------|----------|----------|----------|
| Option      | L1       | L2       | L3       | L4       | L5       |
| Part number | 8976-550 | 8976-560 | 8976-570 | 8976-580 | 8976-620 |
| Mass (g)    | 100      | 104      | 103      | 102      | 102      |
| Shell size  | Large    |          | Medium   |          |          |
| Option      | L6       | L7       | M1       | M2       | M3       |
| Part number | 8976-630 | 8976-640 | 8976-590 | 8976-600 | 8976-610 |
| Mass (g)    | 103      | 103      | 62       | 58       | 61       |

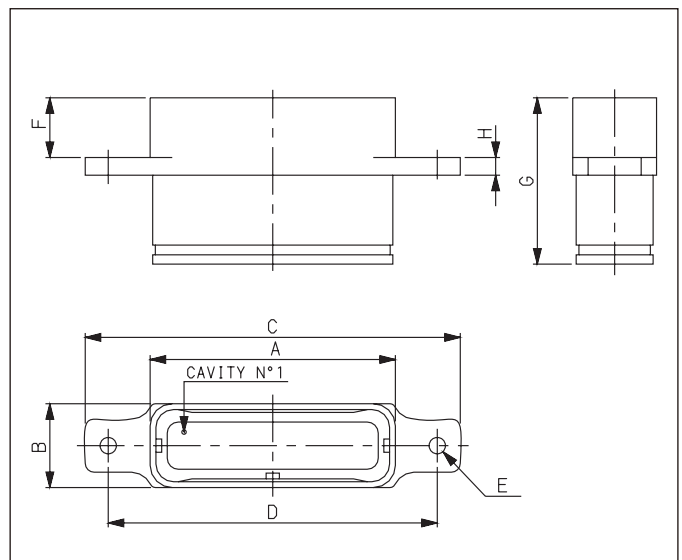
| Dimensions |                                     |                                    |                                    |                                      |                      |                        |
|------------|-------------------------------------|------------------------------------|------------------------------------|--------------------------------------|----------------------|------------------------|
| Shell size | A                                   | B                                  | C                                  | D                                    | E                    | F*                     |
| Large      | 74,70 <sup>0</sup> <sub>-0,10</sub> | 18,80 <sup>0</sup> <sub>-0,1</sub> | 22,00 <sup>0</sup> <sub>-0,1</sub> | 107,45 <sup>0</sup> <sub>-0,3</sub>  | 97,00                | Ø 3,65 <sup>+0,2</sup> |
| Medium     | 52,10 <sup>0</sup> <sub>-0,10</sub> | 15,80 <sup>0</sup> <sub>-0,1</sub> | 19,00 <sup>0</sup> <sub>-0,1</sub> | 84,85 <sup>0</sup> <sub>-0,3</sub>   | 74,40                | Ø 3,65 <sup>+0,2</sup> |
| Shell size | G                                   | H                                  | I                                  | J                                    | K                    | L                      |
| Large      | 28,30 <sup>0</sup> <sub>-0,1</sub>  | 36,15 <sup>0</sup> <sub>-0,2</sub> | 78,10 <sup>0</sup> <sub>-0,1</sub> | 3,00 <sup>+0,1</sup> <sub>-0,1</sub> | 7,67 <sub>maxi</sub> | Ø 6,73 <sub>maxi</sub> |
| Medium     | 28,30 <sup>0</sup> <sub>-0,1</sub>  | 36,15 <sup>0</sup> <sub>-0,2</sub> | 55,50 <sup>0</sup> <sub>-0,1</sub> | 3,00 <sup>+0,1</sup> <sub>-0,1</sub> | 7,67 <sub>maxi</sub> | Ø 6,73 <sub>maxi</sub> |



### MSSP receptacle (packed reference)

| Shell size  | Large    |          |          |          |          |
|-------------|----------|----------|----------|----------|----------|
| Option      | L1       | L2       | L3       | L4       | L5       |
| Part number | 8976-100 | 8976-110 | 8976-120 | 8976-130 | 8976-170 |
| Mass (g)    | 73       | 76       | 76       | 74       | 74       |
| Shell size  | Medium   |          |          |          |          |
| Option      | M1       | M2       | M3       |          |          |
| Part number | 8976-140 | 8976-150 | 8976-160 |          |          |
| Mass (g)    | 49       | 50       | 49       |          |          |

| Dimensions |                                     |                                    |                                     |       |                        |   |
|------------|-------------------------------------|------------------------------------|-------------------------------------|-------|------------------------|---|
| Shell size | A                                   | B                                  | C                                   | D     | E*                     | F                                       |
| Large      | 78,10 <sup>0</sup> <sub>-0,10</sub> | 22,00 <sup>0</sup> <sub>-0,1</sub> | 107,45 <sup>0</sup> <sub>-0,3</sub> | 97,00 | Ø 3,65 <sup>+0,2</sup> | 13,50 <sup>+0,30</sup> <sub>-0,05</sub> |
| Medium     | 55,50 <sup>0</sup> <sub>-0,10</sub> | 19,00 <sup>0</sup> <sub>-0,1</sub> | 84,85 <sup>0</sup> <sub>-0,1</sub>  | 74,40 | Ø 3,65 <sup>+0,2</sup> | 13,50 <sup>+0,30</sup> <sub>-0,05</sub> |
| Shell size | G                                   | H                                  |                                     |       |                        |   |
| Large      | 37,65 <sup>0</sup> <sub>-0,2</sub>  | 4,05 <sup>0</sup> <sub>-0,1</sub>  |                                     |       |                        |   |
| Medium     | 37,65 <sup>0</sup> <sub>-0,2</sub>  | 4,05 <sup>0</sup> <sub>-0,1</sub>  |                                     |       |                        |   |



# Rectangular Robotic Connectors



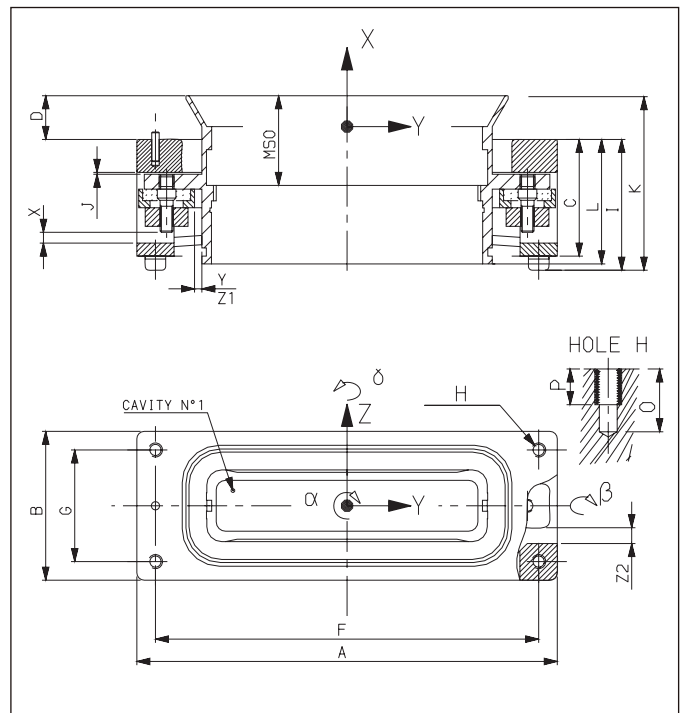
## Dimensions (in mm)

### ORU receptacle with compliance mechanism (Packed reference)

| Part N°    | Layout See Page | Shell Style      |
|------------|-----------------|------------------|
| 8970 - 250 | L1              | Large Receptacle |
| 8970 - 260 | L2              | Large Receptacle |
| 8970 - 270 | L3              | Large Receptacle |
| 8970 - 280 | L4              | Large Receptacle |
| 8970 - 320 | L5              | Large Receptacle |
| 8970 - 290 | M1              | Large Receptacle |
| 8970 - 300 | M2              | Large Receptacle |
| 8970 - 310 | M3              | Large Receptacle |

| Shell size | Large  |     |     |     |     |
|------------|--------|-----|-----|-----|-----|
| Option     | L1     | L2  | L3  | L4  | L5  |
| Mass (g)   | 214    | 218 | 218 | 217 | 217 |
| Shell size | Medium |     |     |     |     |
| Option     | M1     | M2  | M3  |     |     |
| Mass (g)   | 162    | 164 | 163 |     |     |

| Dimensions |                                     |   |   |   |   |                                     |
|------------|-------------------------------------|---|---|---|---|-------------------------------------|
| Shell size | A                                   | B                                       | C                                       | D                                       | F                                       | G                                   |
| Large      | 113,1 <sup>0</sup> <sub>-0,19</sub> | 40,1 <sup>0</sup> <sub>-0,19</sub>      | 31,56 <sup>+0,05</sup> <sub>-0,25</sub> | 11,7 <sup>+0,34</sup> <sub>-0,1</sub>   | 103,00 <sup>0</sup> <sub>00,10</sub>    | 30,00 <sup>0</sup> <sub>00,10</sub> |
| Medium     | 90,5 <sup>0</sup> <sub>0,10</sub>   | 37,1 <sup>0</sup> <sub>0,1</sub>        | 31,56 <sup>+0,05</sup> <sub>-0,25</sub> | 11,7 <sup>+0,34</sup> <sub>-0,1</sub>   | 80,50 <sup>0</sup> <sub>00,10</sub>     | 27,00 <sup>0</sup> <sub>00,10</sub> |
| Shell size | H                                   | I                                       | J                                       | K                                       | L                                       | O                                   |
| Large      | 6-32 UNC<br>class 3B                | 35,36 <sup>+0,13</sup> <sub>-0,47</sub> | 1,15 <sup>+0,20</sup> <sub>-0,10</sub>  | 47,06 <sup>+0,38</sup> <sub>-0,48</sub> | 33,55 <sup>+0,05</sup> <sub>-0,49</sub> | 11,00 <sup>mini</sup>               |
| Medium     | 6-32 UNC<br>class 3B                | 35,36 <sup>+0,13</sup> <sub>-0,47</sub> | 1,15 <sup>+0,20</sup> <sub>-0,10</sub>  | 47,06 <sup>+0,38</sup> <sub>-0,48</sub> | 33,55 <sup>+0,05</sup> <sub>-0,49</sub> | 11,00 <sup>mini</sup>               |
| Shell size | P                                   | X*                                      | Y*                                      | Z1*                                     | Z2*                                     | MSO                                 |
| Large      | 6,00 <sup>mini</sup>                | 3,40 <sup>-0,15</sup> <sub>-0,15</sub>  | 2,025 <sup>mini</sup>                   | 2,525 <sup>mini</sup>                   | 2,775 <sup>mini</sup>                   | 24,10 <sup>0</sup> <sub>0,05</sub>  |
| Medium     | 6,00 <sup>mini</sup>                | 3,40 <sup>-0,15</sup> <sub>-0,15</sub>  | 2,025 <sup>mini</sup>                   | 2,525 <sup>mini</sup>                   | 2,775 <sup>mini</sup>                   | 24,10 <sup>0</sup> <sub>0,05</sub>  |

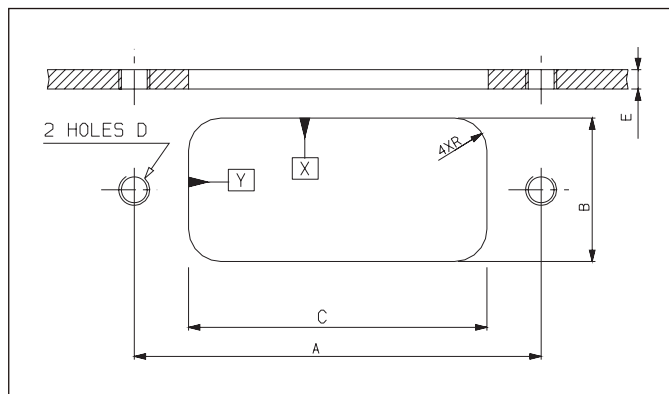


# Rectangular Robotic Connectors

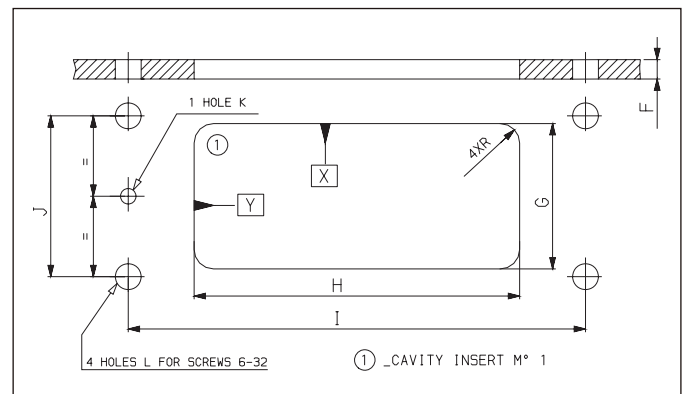


## Panel cut-out

| For plug and receptacle |      |      |      |                |      |   |
|-------------------------|------|------|------|----------------|------|---|
| Shell size              | A    | B    | C    | D              | E    | R |
| Large                   | 97   | 22,3 | 78,4 | 6-32<br>UNC-3B | 3,15 | 4 |
| Medium                  | 74,4 | 19,3 | 55,8 | 6-32<br>UNC-3B | 3,15 | 4 |



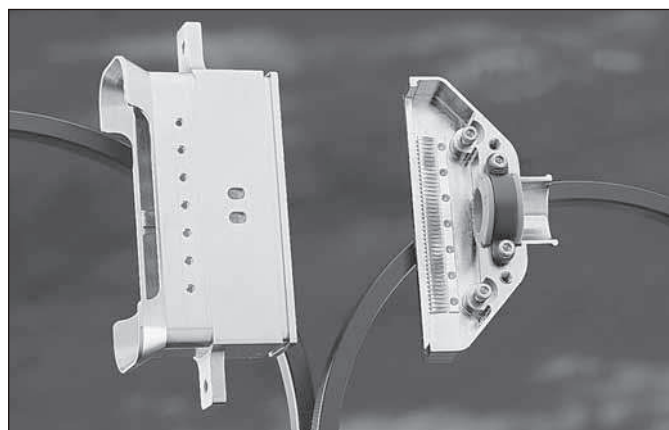
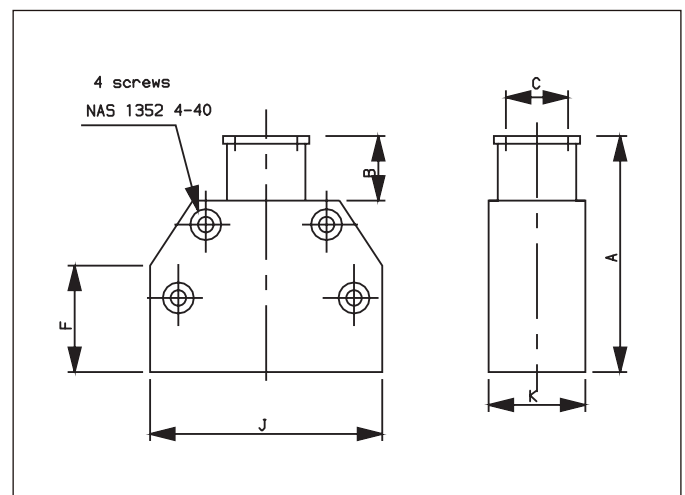
| For compliance mechanism |     |    |      |      |    |        |       |   |
|--------------------------|-----|----|------|------|----|--------|-------|---|
| Shell size               | F   | G  | H    | I    | J  | K      | L     | R |
| Large                    | 3,5 | 32 | 90   | 103  | 30 | ∅ 2,05 | ∅ 3,8 | 4 |
| Medium                   | 3,5 | 29 | 67,5 | 80,5 | 27 | ∅ 2,05 | ∅ 3,8 | 4 |



## Backshells

### Straight outlet normal profile

| Dimensions |             |   |                                      |                     |                                       |                                    |                                    |
|------------|-------------|---|--------------------------------------|---------------------|---------------------------------------|------------------------------------|------------------------------------|
| Shell size | Part number | A                                       | B                                    | C                   | F                                     | J                                  | K                                  |
| Large      | 8976-180    | 39,50 <sup>+0,15</sup> <sub>-0,25</sub> | 9,45 <sup>+0,1</sup> <sub>-0,1</sub> | 368 mm <sup>2</sup> | 15,05 <sup>+0,3</sup> <sub>-0,4</sub> | 80,05 <sup>0</sup> <sub>-0,2</sub> | 25,4 <sup>0</sup> <sub>-0,35</sub> |
| Medium     | 8976-190    | 39,50 <sup>+0,15</sup> <sub>-0,25</sub> | 9,45 <sup>+0,1</sup> <sub>-0,1</sub> | 173 mm <sup>2</sup> | 15,45 <sup>+0,3</sup> <sub>-0,4</sub> | 57,45 <sup>0</sup> <sub>-0,2</sub> | 22,4 <sup>0</sup> <sub>-0,37</sub> |

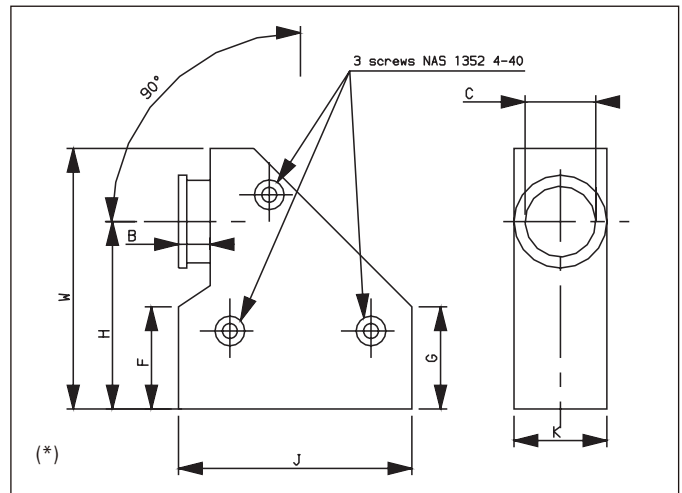




## Backshells

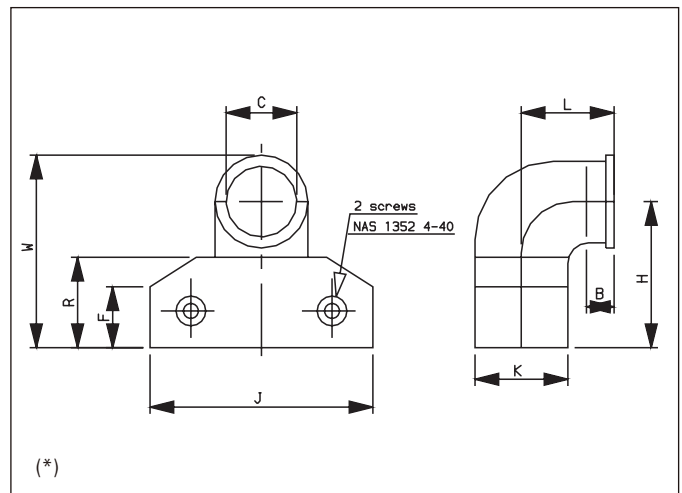
### 90° longitudinal outlet normal profile

| Dimensions |             |   |                                      |   |   |
|------------|-------------|---|--------------------------------------|---|---|
| Shell size | Part number | F                                       | G                                    | H                                       | W                                       |
| Large      | 8976-200    | 16,85 <sup>+0,25</sup> <sub>-0,15</sub> | 22,2 <sup>+0,1</sup> <sub>-0,1</sub> | 36,35 <sup>+0,05</sup> <sub>-0,05</sub> | 54,85 <sup>+0,10</sup> <sub>-0,20</sub> |
| Medium     | 8976-210    | 16,00 <sup>+0,1</sup> <sub>-0,1</sub>   | 22,2 <sup>+0,1</sup> <sub>-0,1</sub> | 38,10 <sup>+0,05</sup> <sub>-0,05</sub> | 54,85 <sup>+0,10</sup> <sub>-0,20</sub> |



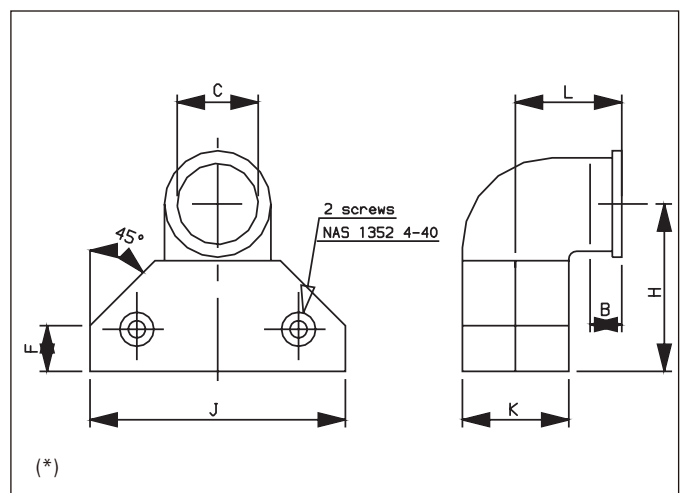
### 90° transverse outlet normal profile

| Dimensions |             |   |   |   |
|------------|-------------|---|---|---|
| Shell size | Part number | L                                       | W                                       | R                                       |
| Large      | 8976-220    | 26,50 <sup>+0,50</sup> <sub>-0,50</sub> | 51,00 <sup>+0,40</sup> <sub>-0,40</sub> | 24,45 <sup>+0,35</sup> <sub>-0,35</sub> |
| Medium     | 8976-230    | 25,40 <sup>+0,50</sup> <sub>-0,50</sub> | 48,90 <sup>+0,40</sup> <sub>-0,40</sub> | 24,45 <sup>+0,35</sup> <sub>-0,35</sub> |



### 90° transverse outlet low profile

| Dimensions |             |                                       |                                  |                                    |                                   |
|------------|-------------|---------------------------------------|----------------------------------|------------------------------------|-----------------------------------|
| Shell size | Part number | C                                     | F                                | H                                  | L                                 |
| Large      | 8976-400    | 17,60 <sup>+0,2</sup> <sub>-0,2</sub> | 9,5 <sup>0</sup> <sub>-0,2</sub> | 49,2 <sup>0</sup> <sub>-0,35</sub> | 26,8 <sup>0</sup> <sub>-0,5</sub> |

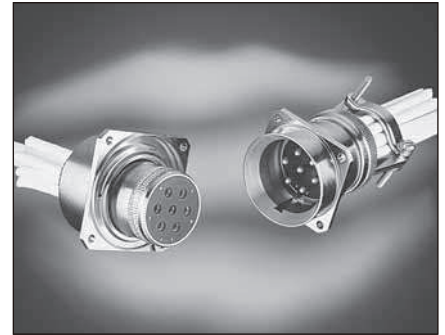


(\*) For other dimensions see page 89



In the frame of Space Station Alpha program, SOURIAU has developed and qualified a series of Quick Disconnect high reliability circular connector for robotic operations. This hardware is used as ORU interface on the JEM (Japanese Experiment Module Exposed) Facility which is part of the Japanese contribution to the Space Station. These connectors feature :

- Low Insertion Force contacts
- Thermal gradient compatibility
- Integrated misalignment catching system
- High durability (6000 operations)
- High EMI shielding efficiency
- Deep space environment (Atox) compatibility
- Arrangements from MIL-DTL-38999.



## Performances

### Mechanical and electrical

| Mechanical   |
|--|
| <b>Mass</b> <ul style="list-style-type: none"> <li>• &lt; 180 g for ORU plug</li> <li>• &lt; 95 g for receptacle</li> </ul>  |
| <b>ORU plug misalignments</b> <ul style="list-style-type: none"> <li>• <math>\Delta\alpha = \pm 0,9^\circ</math> (movement around the X axis)</li> <li>• <math>\Delta\beta = \pm 0,9^\circ</math> (angle authorized between the panels)</li> <li>• <math>\rho = 1,95</math> mm (plane movement according to Y and Z requirements)</li> </ul> |
| <b>ORU receptacle overstroke</b> <ul style="list-style-type: none"> <li>• <math>\Delta X \geq 1,5</math> mm</li> </ul>   |

| Electrical                              |
|---|
| Contact resistance as per MIL-DTL 39029 |

### Materials and finishes

|                  | Components   | Material  | Finish              |
|------------------|--|---|---------------------|
| <b>Connector</b> | Shells (receptacle & plug)                             | Aluminium alloy 7075  | Nickel plating      |
|                  | Inserts<br>- Insulator<br>- Grommet                    | Epichlorhydrile + Polyal + Glass fiber<br>or Polyetherimide resin<br>Silicone | -                   |
|                  | Contacts   | see contacts L.I.F.   | see contacts L.I.F. |
|                  | Contact retaining clip                                 | Copper alloy  | -                   |
| <b>LSD (*)</b>   | Receptacle & plug bottom plate<br>and mechanical parts | Aluminium alloy 7075  | Nickel plating      |
|                  | Springs  | Stainless steel   | -                   |

(1) LSD : Lauching Security Device

### Mating/Demating forces

|                  | Mating force (N) (2) | Demating force (N) |
|------------------|----------------------|--------------------|
| <b>25L-3</b>     | 62                   | 52                 |
| <b>25L-7</b>     | 84                   | 63                 |
| <b>25-19</b>     | 125                  | 102                |
| <b>25-20</b> (1) | 161                  | 158                |
| <b>25-35</b>     | 142                  | 116                |
| <b>25-61</b>     | 110                  | 84                 |

(1) Configuration 3 # 16 optical contacts + 3 # 16 electrical contacts

(2) At room condition before compliance mechanism acting.



## Part Number / Characteristics

| SOURIAU<br>Part number | Type       | Mass in gram<br>(with contacts) | Insert | Layouts        |           | Male insert<br>(in front view) |
|------------------------|------------|---------------------------------|--------|----------------|-----------|--------------------------------|
|                        |            |                                 |        | Qty            | Type      |                                |
| 8977-09A               | Plug       | 178                             | 25L-3  | 1              | # 8 (pc)  |                                |
| 8977-10A               | Receptacle | 92                              |        | 2              | # 4 (pc)  |                                |
| 8977-11A               | Plug       | 187                             | 25L-7  | 7              | # 8 (pc)  |                                |
| 8977-12A               | Receptacle | 96                              |        |                |           |                                |
| 8977-15A               | Plug       | 177                             | 25-19  | 19             | # 12 (pc) |                                |
| 8977-16A               | Receptacle | 87)                             |        |                |           |                                |
| 8977-17A               | Plug       | 177                             | 25-20  | 10             | # 20 (pc) |                                |
| 8977-18A               | Receptacle | 87                              |        | 13             | # 16 (pc) |                                |
|                        |            |                                 |        | 4              | # 12 (cc) |                                |
|                        |            |                                 | 3      | # 8 (cc)       |           |                                |
| 8977-19A               | Plug       | 174                             | 25-35  | 128            | # 22 (sc) |                                |
| 8977-20A               | Receptacle | 81                              |        |                |           |                                |
| 8977-13A               | Plug       | 169                             | 25-61  | 61             | # 20 (sc) |                                |
| 8977-14A               | Receptacle | 77                              |        |                |           |                                |
| 8977-31A               | Receptacle | 70                              | 25-43  | 23             | # 20 (pc) |                                |
| 8977-32A               | Plug       | 135                             |        | 20             | # 16 (pc) |                                |
| 8977-25A               | LSD-P      | 86                              |        | for plug       |           |                                |
| 8977-24A               | LSD-R      | 11                              |        | for receptacle |           |                                |

(pc) : power contact ; (cc) : coax contact ; (sc) : signal contact

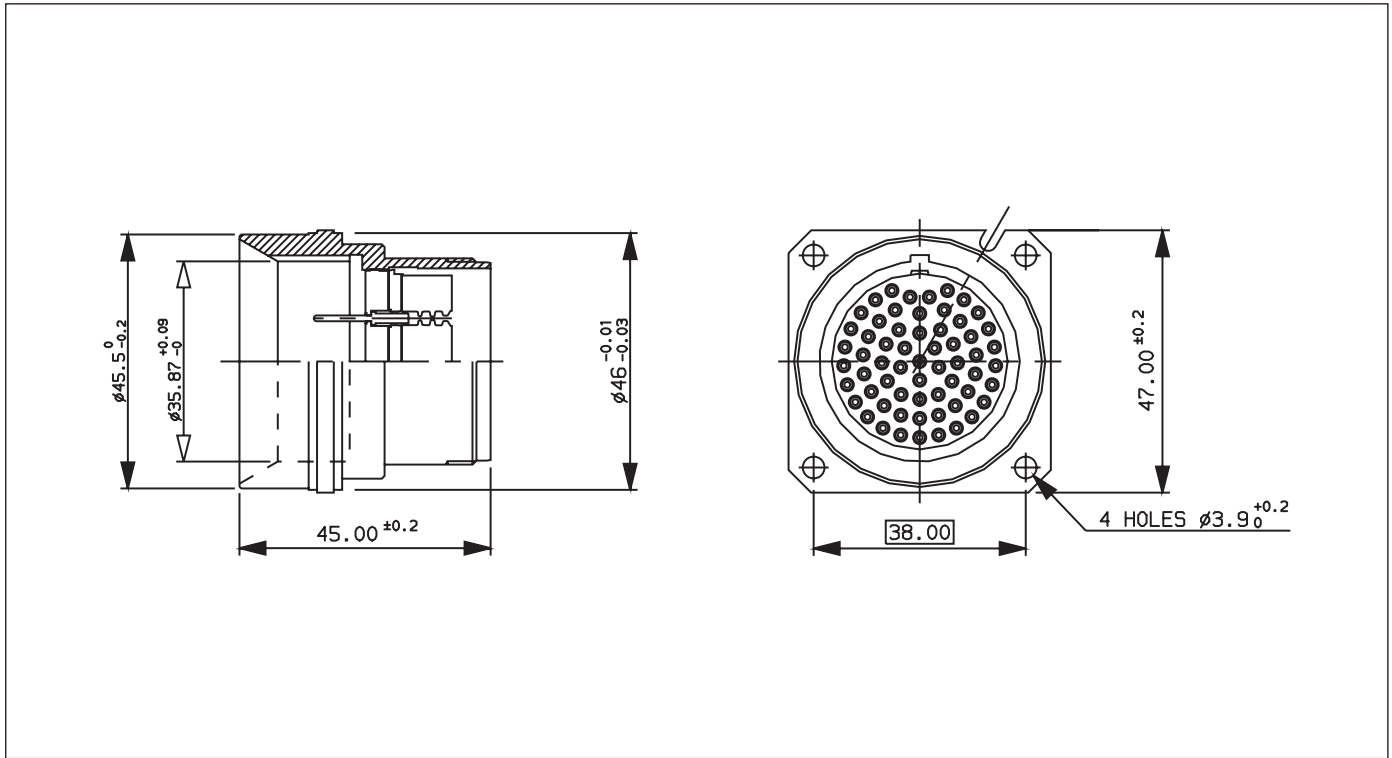




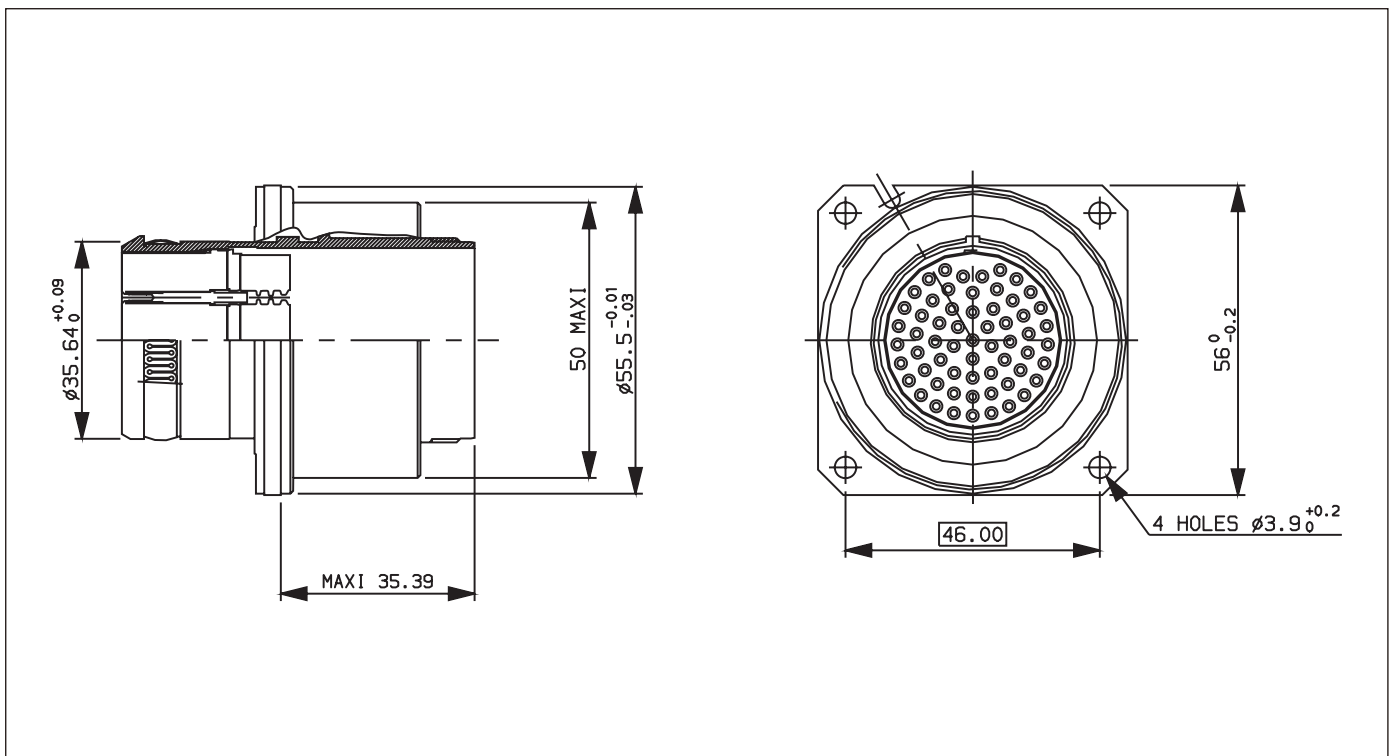
# Circular Robotic Connectors

## Dimensions for Quick Disconnect (QD) Connector

### Receptacle



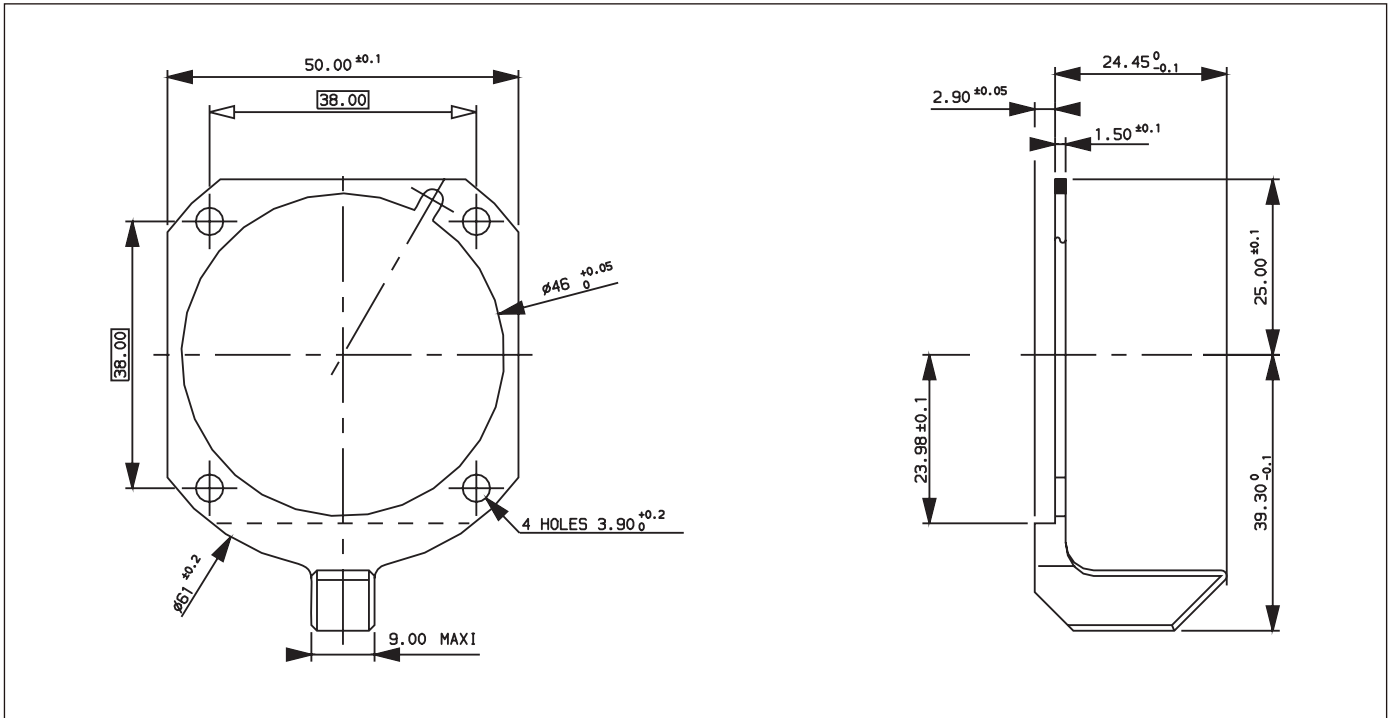
### Plug



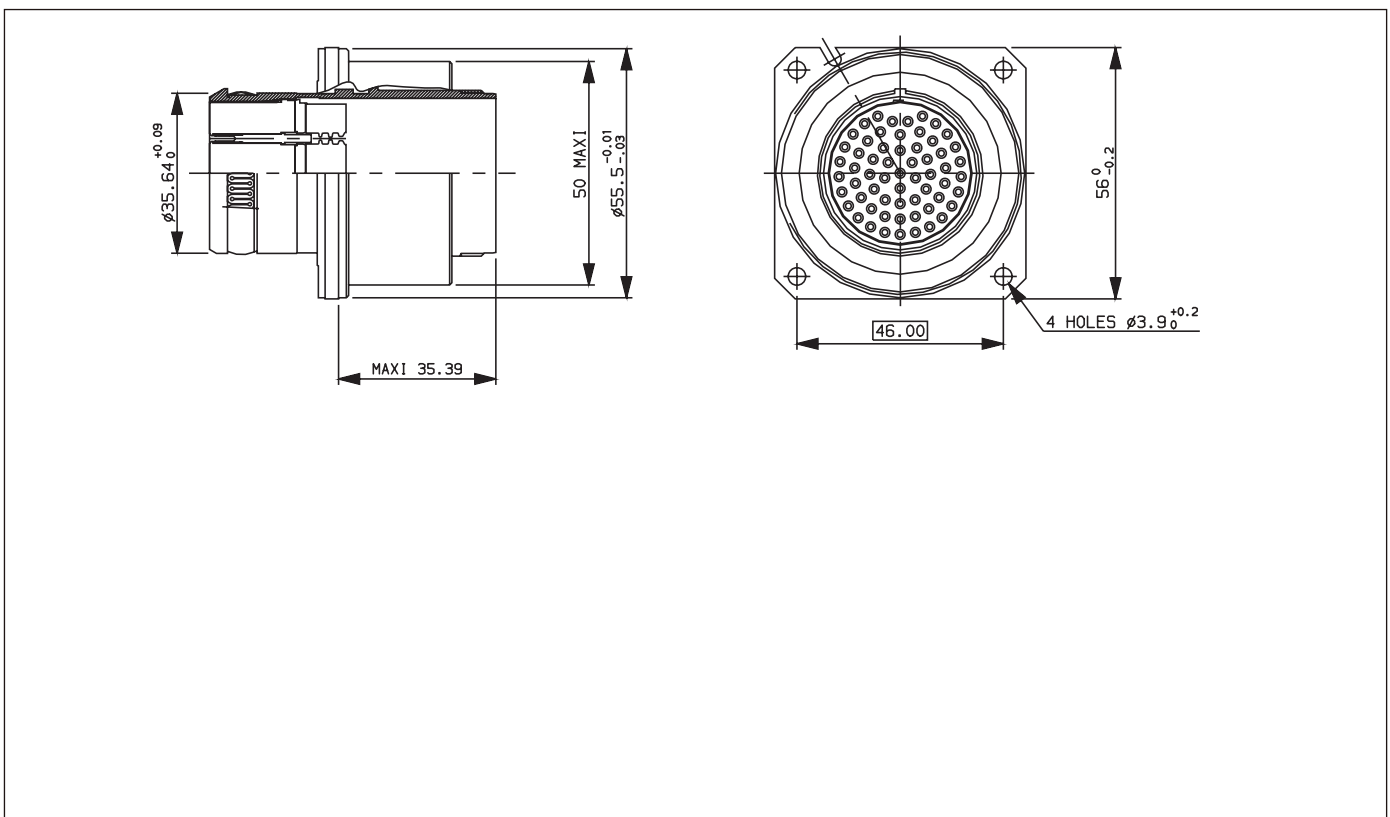


## Dimensions for Launching Security Device (LSD)

### LSD Receptacle



### LSD Plug



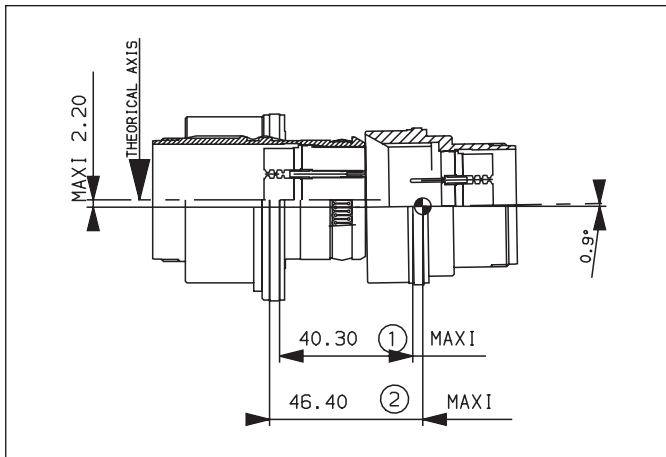


# Circular Robotic Connectors

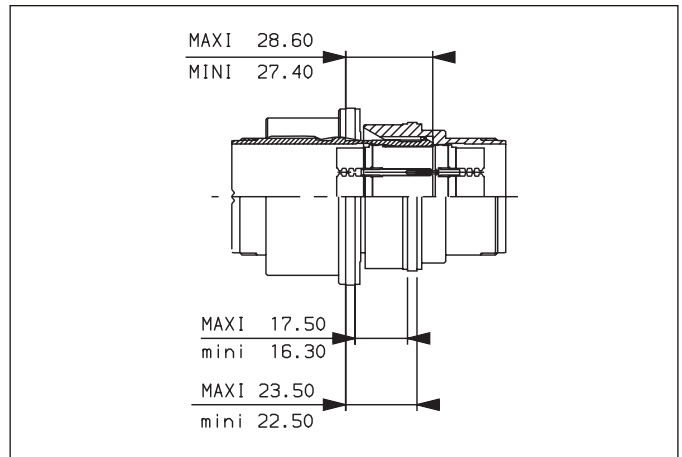
## Presentation & Configuration for coupling

### Receptacle & Plug

Before mating



After mating



During the mating operation, the receptacle comes up to plug. The front of plug enters in receptacle cone. When plug touches the cone, this induces a lateral movement of plug shell relatively to the flange fixed on panel. This movement stops when the plug shell axis is in conformance with the receptacle ones.

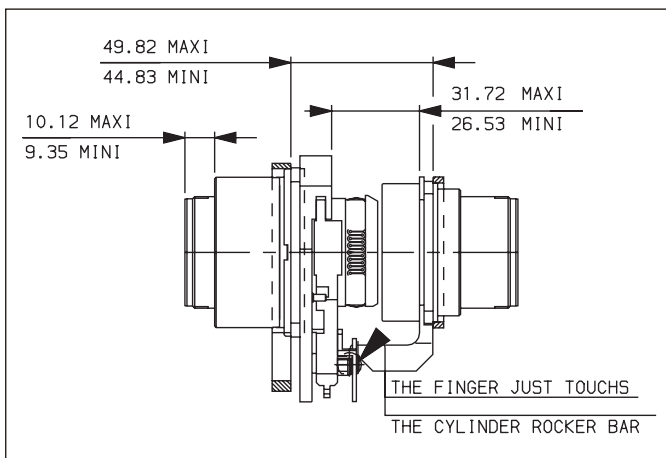
The axial movement induces engagement of the plug shell key in the plug receptacle keyway, its entry cone inducing the rotation of plug shell around the X axis.

At the end of the total connection, plug comes to touch the internal face of the receptacle. The relative axial movement continues, which induces the displacement of plug shell comparatively to the flange fixed on panel. This displacement of plug shell compresses the spring in external casing.

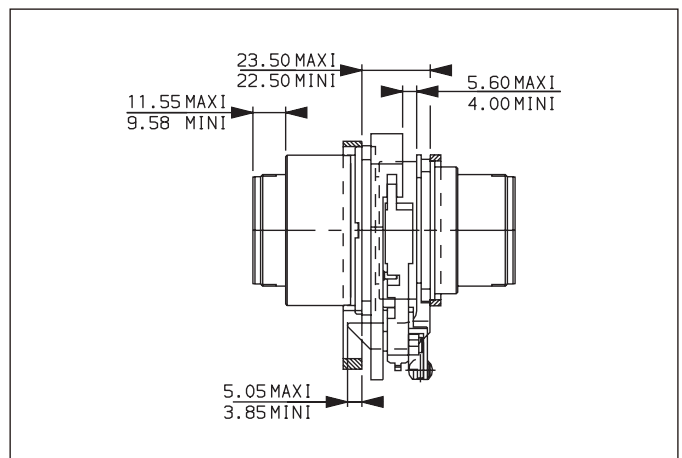
The minimum guaranteed overstroke is 1,5 mm.

### Connector with Launching Security Device (LSD)

Before mating



After mating



The Launching Security Device is designed to catch the floating connector plug shell during the flight.

Its two principal parts are respectively fixed with plug and receptacle flanges.

LSD side is fixed on plug flange. The plug shell is blocked by two arms and the system is locked by the cylinder rocker bar.

The LSD arms prevent plug shell movements caused by vibrations and acceleration during the launch.

When the coupling of the two parts happens, the finger of receptacle part pushes the cylinder rocker bar which releases the arms and liberates plug shell.

At this point, the mating occurs as described above.

The LSD in unlocked position will necessitate an external and manual action to be locked again on plug shell.

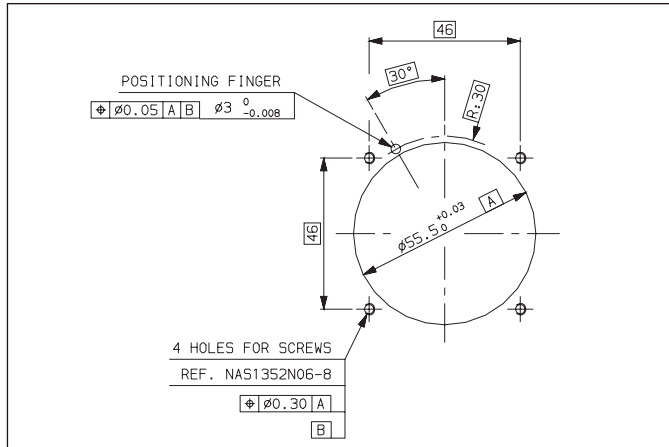


# Circular Robotic Connectors

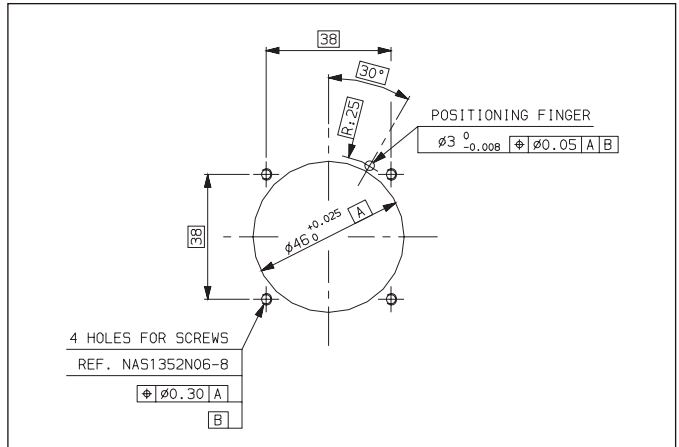
## Panel cut-out

### Without Launching Security Device (LSD)

#### Plug

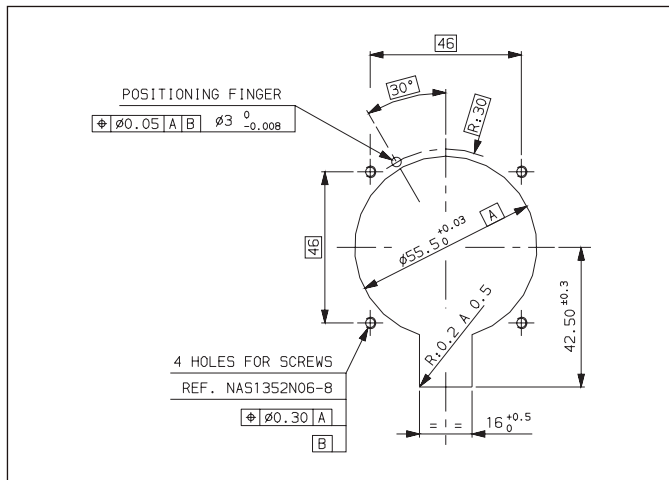


#### Receptacle

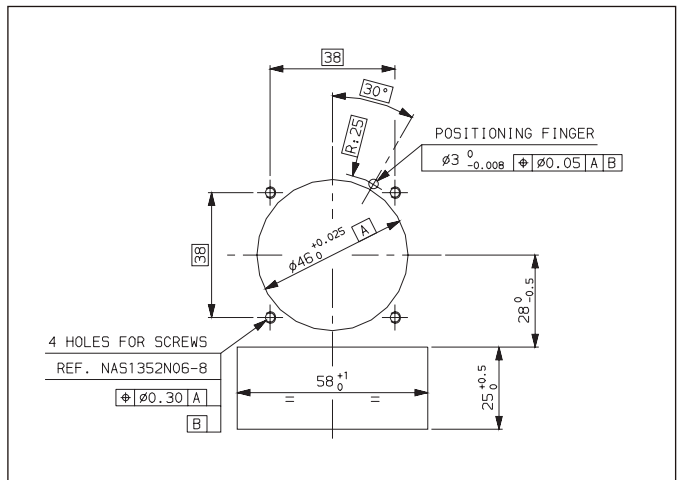


### QD connector with Launching Security Device (LSD)

#### Plug



#### Receptacle



## Crimping, Insertion & Removal tools for contacts

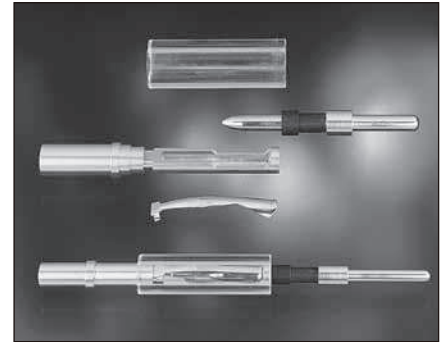
| Size contacts | Contact    | Crimping tools  | Positioner                   | Insertion & Removal plastic tools |
|---------------|------------|---|------------------------------|-----------------------------------|
| # 22          | Pin Socket | M 22520/2-01  | M 22520/2-09<br>M 22520/2-07 | M 81696/14-01                     |
| # 20          | Pin Socket | M 22520/1-01  | M 22520/1-04                 | M 81696/14-10                     |
| # 16          | Pin Socket |   |                              | M 81696/14-03                     |
| # 12          | Pin Socket |   |                              | M 81696/14-04                     |
| # 8           | Pin Socket | M 22520/23-01<br>+ M 22520/23-02                        | M 22520/23-09                | M 81696/14-12*                    |
| # 4           | Pin Socket | M 22520/23-01<br>+ M 22520/23-04                        | M 22520/23-11                | M 81696/14-07*                    |
| # 8 coax      | Pin Socket | M 22520/1-01<br>+ M 22520/5-01<br>+ M 22520/5-45 (jaws) | C31-SN 1891<br>K103          | 8660-197* (1)                     |



## Field of Application

This type of contact is used when low mating/demating forces and/or high number of mating/demating cycles are required. These contacts are compatible with following connectors :

- MIL-DTL-38999 connectors
- Rack-panel
- Extra Vehicular Activity Connectors (8976, MAXI-D & 8977).



## Developed Sizes

- # 22
- # 20
- # 16
- # 12 power
- # 12 coax
- # 8 power
- # 8 triax
- # 4 power

## Characteristics

### Description and assets

LIF contacts insure a minimum mating/demating force and are qualified for over 6000 mating/demating cycles (instead of 500 for standard contacts). The other benefits of such contacts are :

- They are suitable for Extra-Vehicular Activity (EVA) operations performed by astronauts or by manipulator arms in deep space environment.
- They limit the force needed for mating and demating thanks to their elastic concept.
- The insulator cavities are based on the MIL-DTL-38999.
- They suffer no variation of contact resistance versus mechanical lifetime.

### Parameters

| Size of contacts |                      | Max insertion Force (N) | Contact resistance (mΩ) |
|------------------|----------------------|-------------------------|-------------------------|
| # 22             |                      | 0,4                     | 14                      |
| # 20             |                      | 0,9                     | 7                       |
| # 16             |                      | 2,7                     | 4                       |
| # 12             |                      | 4,4                     | 3,5                     |
| # 12 coax        | Inner contact        | 3 (mounted)             | 5,5                     |
|                  | Outer contact        |                         | 6,25                    |
| # 8              |                      | 7,5                     | 3                       |
| # 8 triax        | Inner contact        | 6 (mounted)             | 10                      |
|                  | Intermediate contact |                         | 10                      |
|                  | Outer contact        |                         | 6,25                    |
| # 4              |                      | 12                      | 2,5                     |

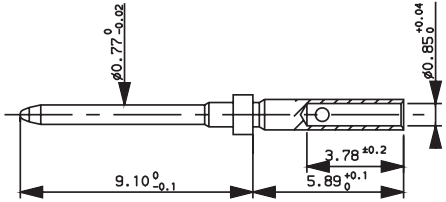
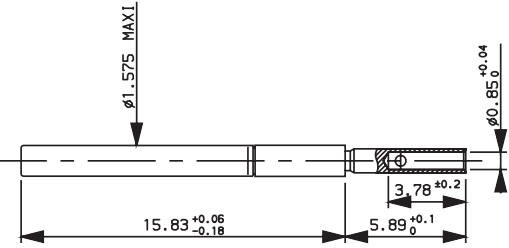
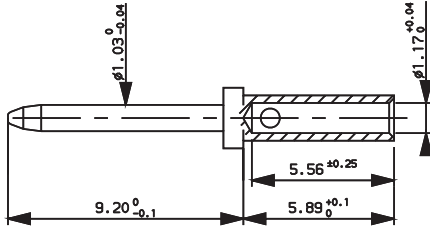
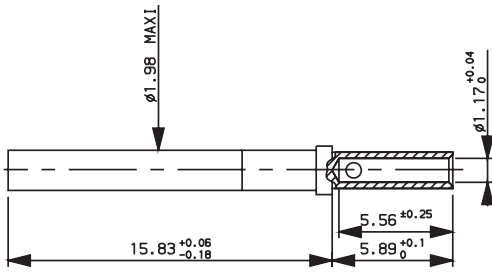
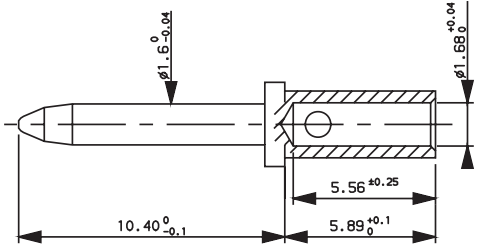
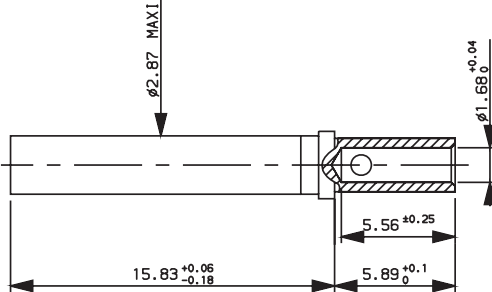
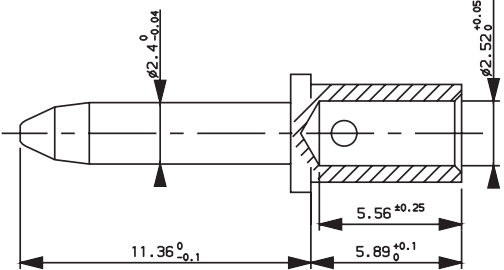
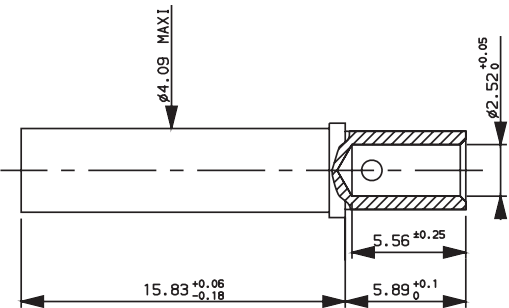
These figures explain the naming «Low Insertion Force» and its direct effect on the increase of contact life.

## Design and materials

| Contact type                | Material                                 | Finish  |
|-----------------------------|--|---|
| Pin<br>Socket (# 20 to # 4) | Copper alloy                             | Electroless nickel<br>2,54 μm gold doped nickel |
| Pallet (# 20 to # 12)       | Beryllium copper<br>(plastic properties) | 2,54 μm gold doped nickel                       |
| Pallet Lif (# 22)           | Beryllium nickel                         | 2,54 μm gold doped nickel                       |
| # 12 coax                   | Pin                                      | Copper alloy                                    |
|                             | Socket                                   | Beryllium copper                                |
|                             | Insulator                                | PTFE (Teflon)                                   |
| # 8 triax                   | Pin                                      | Copper alloy                                    |
|                             | Socket                                   | Beryllium copper                                |
|                             | Insulator                                | PTFE (Teflon)                                   |



## Part Number & Dimensions (in mm)

| Size of contacts | Pin  | Socket  |
|------------------|--|---|
| # 22             |  <p>Part number : 8976-350 (packed per 250)</p>   |  <p>Part number : 8976-650 (packed per 250)</p>   |
| # 20             |  <p>Part number : 8976-360 (packed per 250)</p>  |  <p>Part number : 8976-660 (packed per 250)</p>  |
| # 16             |  <p>8976-93A (for information)</p>              |  <p>8976-30A (for information)</p>              |
| # 12             |  <p>Part number : 8976-370 (packed per 100)</p> |  <p>Part number : 8976-670 (packed per 100)</p> |



## Part Number & Dimensions (in mm)

| Size of contacts            | Pin   | Socket  |
|-----------------------------|---|---|
| <p><b># 12<br/>coax</b></p> | <p><b>Part number : 8976-380 (qty : 30)</b></p> | <p><b>Part number : 8976-680 (qty : 30)</b></p> |
| <p><b># 8<br/>triax</b></p> | <p><b>Part number : 8977-388A (qty : 1)</b></p> | <p><b>Part number : 8977-389A (qty : 1)</b></p> |
| <p><b># 8</b></p>           | <p><b>Part number : 8975-1949</b></p>           | <p><b>Part number : 8975-1988</b></p>           |
| <p><b># 4</b></p>           | <p><b>Part number : 8975-1952</b></p>           | <p><b>Part number : 8975-1989</b></p>           |