



UL/IEC Power + Control Supply





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# UTL SERIES

# Overview

|                                           |    |
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| ■ General technical characteristics ..... | 10 |

## Typical applications



Stage & Light



Energy - Power



Building Automation & Control



Telecom - Data infrastructure



Medical



Instrumentation & Measurement

## Features & Benefits

### EASY TO TRUST

- High level of UL & IEC qualification
- IP68/69K & UV Resistant
- IK07 Impact Resistant
- Moisture proof

### EASY TO USE

- Push-pull coupling
- Blind mateable
- Sensitive tactile and audible click

### EASY TO SUPPLY

- Worldwide distributor network
- Short lead-time

### EASY TO CUSTOMIZE

- Turnkey solution thanks to our overmould capabilities with your cable spec
- Strong R&D team to develop customized solutions

**UTL MAKES YOUR LIFE EASIER**

## PLUGS



## HARNESS

Overmould  
(straight or right angle)

UTL6

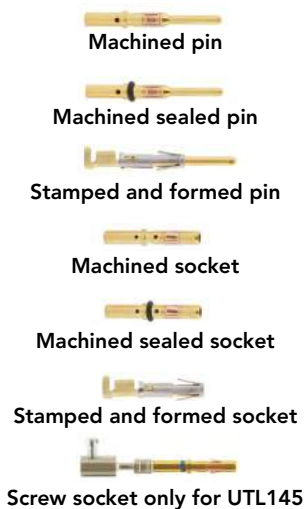


Backshell UTLJC only for 4 pos (103G1) & 5 pos. (145)  
"Clip" backshell only available for UTL size 14:  
connector layout 145

UTL6JC only for 4 pos (103G1) & 5 pos. (145)



## TYPES OF CONTACTS



Terminating Resistor  
120Ω impedance

Only for 6 pos. (102G1W3) & 8 pos. (122G1W5)



## EVALUATION KIT



overview

RECEPTACLES

UTL1JC only for 4 pos (103G1)



In line - UTL1



Jam nut - UTL7



Square flange - UTL0 only for 4 pos. (103G1)



Terminating Resistor  
120Ω impedance  
Only for 6 pos. (102G1W3) & 8 pos. (122G1W5)



HARNESS

Overmould  
(straight or right angle)





## Description

- The UTL Series is a plastic connector range that meets industrial safety standards.
- UTL can be used for power supply and power + control supply with DMX or RDM signal.
- The «Key hole» of the coupling system allows blind mating. In dark conditions the mechanical discriminations allow easy mating to avoid connector damage.
- The stainless steel latch coupling system is simple to use. With only 1 finger, connectors are mated with an audible click.
- An optional protective shroud is also available to prevent the disconnection of the connectors without a tool.
- The UTL Series is rated at IP68/69K even in dynamic conditions and remains sealed even when used continuously underwater or cleaned using a high pressure hose while the cable is moving.
- The UTL Series uses an outdoor rated material per Underwriters Laboratories.
- Cable assembly equipped with DMX + Power cables suitable for outdoor use (PUR or Neoprene outer jacket), please consult us for more information.

## Technical features

### Materials

- **Housing:** Thermoplastic
- **Contacts:** Copper alloy
- **Latch:** Stainless steel

### Electrical

- Connector specially designed to be engaged or disengaged in normal use when live or under load
- First Mate Last Break contact mating on ground line
- Signal lines (for UTL102G1W3 & UTL122G1W5): RS485 compliant, 2.5A 10V
- Finger touch proof (connector equipped with socket contacts)
- **In accordance with:**
  - Connector standards:
    - . UL 1977: UL file number ECBT2.E169916
    - . IEC 61984: please consult us
    - . C22.2 N°182.3: file number ECBT8.E169916
  - Equipment standards:
    - . IEC60065, IEC60598, IEC61076-2-103, IEC60320

- Raw material standards:

- . UL94
- . UL746



### Environmental

- **Temperature class (according to IEC61984):**  
From -40°C to +105°C for connector
- **Flammability rating:**  
UL 94: V-0 for connector  
UL94: 5VA for thermoplastic  
UL746C: 5 inch (127mm) end-product flame test
- **Salt spray:**  
≥1,000 hours
- **UV resistant:**  
No mechanical degradation or important color variation due to environmental exposure (F1 material per the UL 746C)
- **Sealing:**
  - IP68/69K mated with standard contacts
  - IP68/69K unmated with specific contacts
  - IP68 1 bar / 1 week
  - IP67 mated for evaluation kits
  - Moisture proof capability

### Fluid resistance:

- Gas and oil
- Mineral oil
- Acid bath
- Basic bath
- For other fluids, please consult us

### Halogen free

### RoHS compliant



### Mechanical

- **Durability:**
  - 250 mating in CBC (Current Breaking Capacity) use (UL1977; IEC61984)
  - 500 mating in COC use (IEC61984)
  - 1,000 matings & unmatings tested
- **Coupling system:**
  - Sensitive and audible click
  - Blind mating
- **Touchproof:**  
IP2X in unmated condition (connector equipped with socket contacts)
- **Shock:**  
IK07 according to IEC62262

## Qualification time saving

In today's fast paced environment we are all buying electronic devices with confidence. To achieve such a high level of trust, the regulator had to put in place a wide variety of safety standards. Some are dedicated to the equipment, some to the connection.

SOURIAU designed and qualified the UTL Series according to the UL 1977 and IEC 61984 but we also took into account additional requirements.

**UL 1977 & IEC 61 984 Qualified**



**Additional Capabilities**



- ☒ Impact resistance
- ☒ Stress relief
- ☒ Flame retardant
- ☒ Finger probe
- ☒ Aging
- ☒ Hot wire
- ☒ Bending
- ☒ Current breaking



In this way, the UTL Series is also compliant with ALL equipment standards mentioned below.



## Easy Equipment Qualification

Now, the qualification of your equipment is much easier.

|              |                                                                                           |
|--------------|-------------------------------------------------------------------------------------------|
| UL201        | Safety standard of industrial equipment                                                   |
| UL 1995      | Heating and cooling equipment                                                             |
| UL 2238      | Cable assemblies and fittings for industrial control and signal distribution              |
| IEC 60601    | Medical equipment                                                                         |
| IEC 61010    | Safety requirements for electrical equipment for measurement, control, and laboratory use |
| IEC 60598    | Street lights                                                                             |
| UL/IEC 60950 | Information technology equipment                                                          |



# UTL SERIES

# Connector

|                                                          |    |
|----------------------------------------------------------|----|
| ■ Customized solution & overmoulded cable assembly ..... | 14 |
| ■ 3 Contacts + ground<br>103G1: 16A 500V.....            | 18 |
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| ■ 6 Contacts<br>102G1W3: 16A 500V.....                   | 24 |
| ■ 8 Contacts<br>122G1W5: 16A 500V.....                   | 30 |

## Customized solution capability

SOURIAU has been designing harsh environment connectors for over one century, year after year developing customized solutions based on dedicated technical specifications from our customers. Thanks to a strong R&T and R&D department and a certified laboratory, we're able to propose customized solutions; the only limit is your imagination!



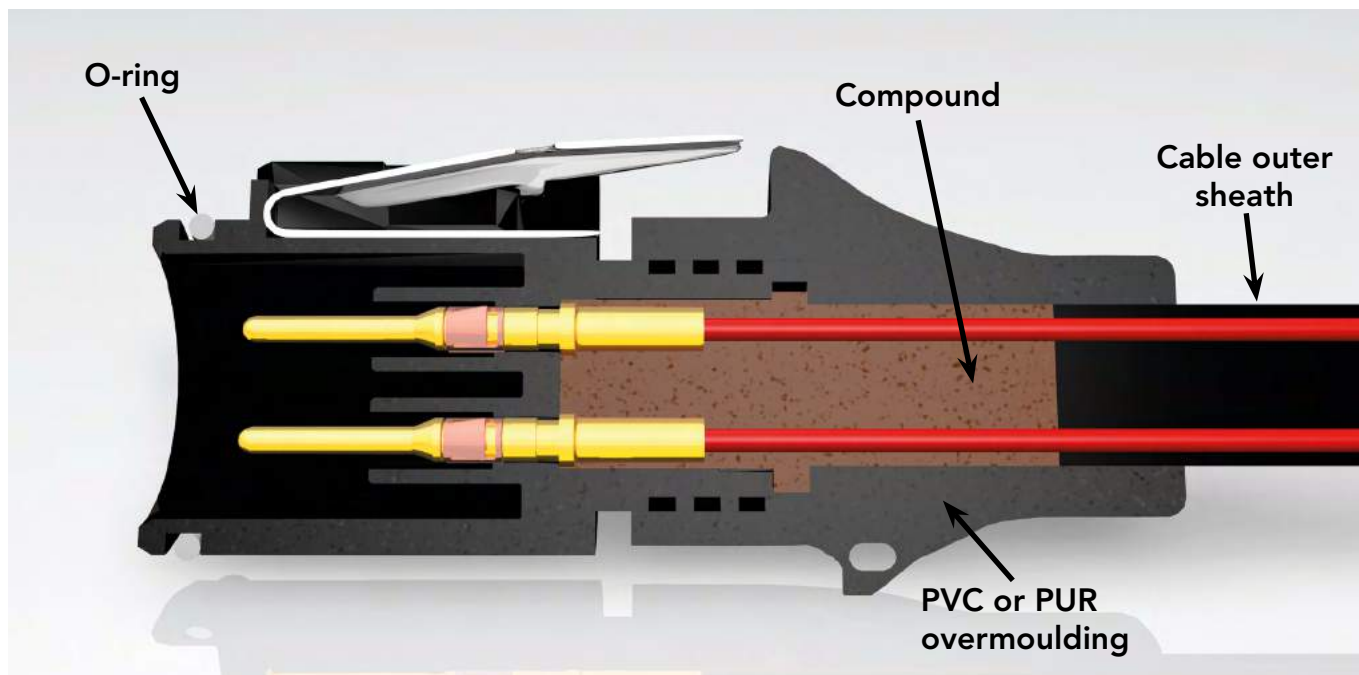
## Overmoulded cable assembly

SOURIAU has provided connectors for various applications for more than 90 years that have been used in the most extreme environments. Conscious about the difficulty in finding a quick and reliable harness manufacturer, we began our own in-house overmoulded cable assembly production. It allows customers to reduce the number of suppliers and to take advantage of the "best in class" quality of the SOURIAU group. Overmoulding is a process that further enhances the sealing properties and helps to minimize stress on the cable termination to the connector. In addition, the wires are encapsulated inside the molding which creates a barrier preventing liquid/moisture from entering the equipment through the connector or cable jacket if breached.



## UTL overmoulded cable assembly

### Overmoulding description



### Connector with cable gland backshell

GOOD



### Overmoulded connector

BEST



Overmould design for illustration purpose only

## UTL overmoulded cable assembly



### Description

#### Cable - 3 + ground

- Outer sheath: rubber compound EM2 in acc. to HD 22.1 that is VDE 0282 part 1
- Outer sheath color: black
- Flame retardant in acc. to IEC 60332-1-2 resp. VDE 0482 part 332-1-2
- Resistant to Oil, Solvents, Water, Ozone, aging and abrasion

#### Cable - 6 pos.

- Signal: 1 x 2 x 0.22 + shielding  
Power: 3G1.5
- Outer sheath: PUR RAL9005
- Outer sheath color: black
- Core section: 0.22 mm<sup>2</sup> and 1.5 mm<sup>2</sup>

#### Cable - 8 pos.

- Signal: 2 x 2 x 0.22 + shielding  
Power: 3G1.5
- Outer sheath: PUR RAL9005
- Outer sheath color: black
- Core section: 0.22 mm<sup>2</sup> and 1.5 mm<sup>2</sup>

## Specifications

| PLATING    | SALT SPRAY | TEMPERATURE                                                                                                                                               | WATERPROOF                       | COUPLING                |
|------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------------|
| No plating | ≥1000 H    | Up to + 90° C <sup>(1)</sup> with 103G1 (4 pos)<br>Up to + 80° C <sup>(1)</sup> with 102G1W3 (6 pos)<br>Up to + 80° C <sup>(1)</sup> with 122G1W5 (8 pos) | IP68/69K dynamic mated & unmated | 1,000 matings/unmatings |

(1) See page 17 for more information

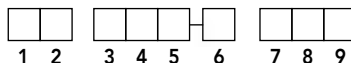
## UTL overmoulded cable assembly

### Cable information

|                              |                                                                                                                                                                  |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Rated voltage:</b>        | U0/U: 450/750 V                                                                                                                                                  |
| <b>Wire section:</b>         | 3 + ground: 2.5 mm <sup>2</sup><br>6 pos. & 8 pos.: 1.5 mm <sup>2</sup> (power), 0.22 mm <sup>2</sup> (signal)                                                   |
| <b>Temperature:</b>          | 3 + ground: flexible use and fixed installation -25° C up to +60° C<br>6 pos. & 8 pos.: flexible use -15° C up to +70° C, fixed installation -30° C up to +70° C |
| <b>Harmonized reference:</b> | 3 + ground: H07 RNF 4G x 2.5<br>6 pos. & 8 pos.: Not Applicable                                                                                                  |

### Standardization of European cable - DIN VDE 0281/DIN VDE 0282/DIN VDE 0292

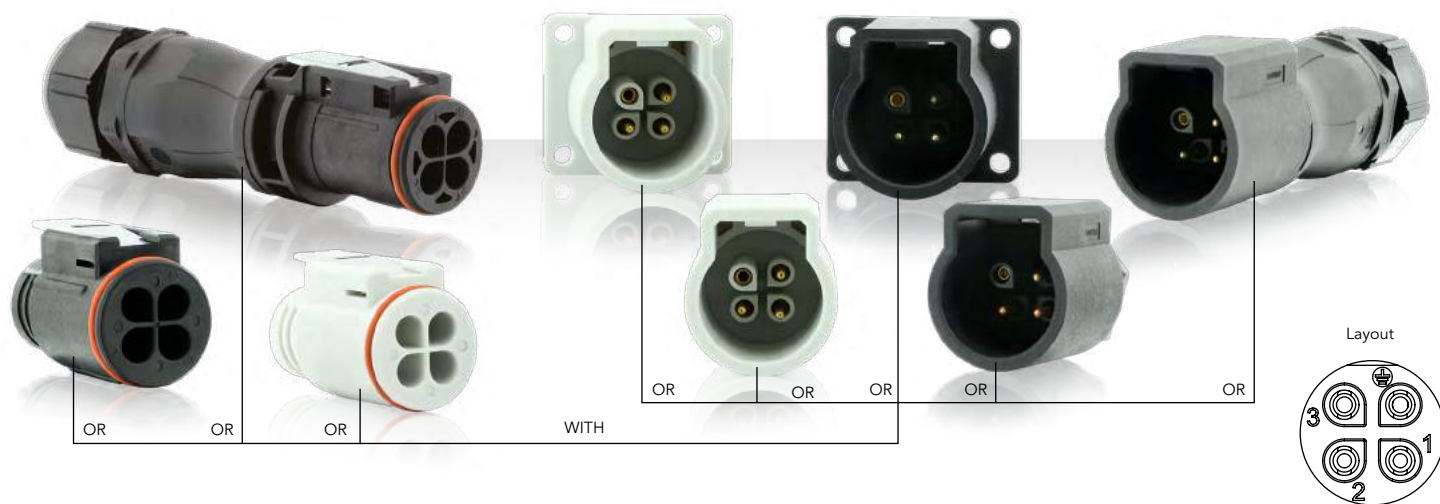
#### Harmonized wire coding system



| 1.<br>Basic type      | 2.<br>Working voltage | 3.<br>Insulation      | 4.<br>Sheath-cladding material | 5.<br>Special features            | 6.<br>Conductor types                   | 7.<br>Number of conductors | 8.<br>Protective conductor         | 9.<br>Conductor cross-sectional   |
|-----------------------|-----------------------|-----------------------|--------------------------------|-----------------------------------|-----------------------------------------|----------------------------|------------------------------------|-----------------------------------|
| H:<br>Harmonized Type | 03:<br>300/300V       | V:<br>PVC             | V:<br>PVC                      | H:<br>Ribbon cable, separable     | U:<br>Single wire                       |                            | X:<br>Without protective conductor | Area specified in mm <sup>2</sup> |
| A:<br>National Type   | 05:<br>300/500V       | R:<br>Rubber          | R:<br>Rubber                   | H2:<br>Ribbon cable non-separable | R:<br>Multi-wire                        |                            | G:<br>With protective conductor    |                                   |
|                       | 07:<br>450/750V       | S:<br>Silicone Rubber | N:<br>Cloroprene Rubber        |                                   | K:<br>Fine wire (permanently installed) |                            |                                    |                                   |
|                       |                       |                       | J:<br>Glass-filament braiding  |                                   | F:<br>Fine wire (flexible)              |                            |                                    |                                   |
|                       |                       |                       | T:<br>Textile braiding         |                                   | H:<br>Super fine wire                   |                            |                                    |                                   |
|                       |                       |                       |                                |                                   | Y:<br>Tinsel strand                     |                            |                                    |                                   |

Example: Harmonized type, 450/750V, rubber insulating, Cloroprene rubber sheath-cladding, Fine wire, 3x1.5 cross-sectional: H07RNF3x1.5

## 103G1 (shell size 10, 3 + ground, 4x#16)



## Connector part number

Plugs and receptacles have to be equipped with both contact genders. Ground lines will never be equipped with the same contacts as the neutral and phase.

| Contact type                                          | Connector type                             | Part number  |              |               |              |
|-------------------------------------------------------|--------------------------------------------|--------------|--------------|---------------|--------------|
|                                                       |                                            | Male insert  |              | Female insert |              |
|                                                       |                                            | Black color  | Grey color   | Black color   | Grey color   |
| Crimp or PCB contacts supplied separately see page 21 | Square flange receptacle                   | UTL0103G1P   | UTL0103G1P03 | UTL0103G1S    | UTL0103G1S03 |
|                                                       | Jam nut receptacle                         | UTL7103G1P   | UTL7103G1P03 | UTL7103G1S    | UTL7103G1S03 |
|                                                       | In line receptacle without backshell       | UTL1103G1P   | UTL1103G1P03 | UTL1103G1S    | UTL1103G1S03 |
|                                                       | In line receptacle with backshell          | UTL1JC103G1P | -            | UTL1JC103G1S  | -            |
|                                                       | Plug for panel mounting                    | UTL5103G1P   | -            | UTL5103G1S    | -            |
|                                                       | Plug for overmoulding                      | UTL6103G1P   | UTL6103G1P03 | UTL6103G1S    | UTL6103G1S03 |
|                                                       | Plug threaded without backshell and O-ring | UTL6TH103G1P | -            | UTL6TH103G1S  | -            |
|                                                       | Plug with backshell                        | UTL6JC103G1P | -            | UTL6JC103G1S  | -            |

Standard delivered packaging: individual bag. For bulk delivery of 100 pcs please add a "B" after the P or S (connector gender) and before the potential "03" digits.

## Overmoulded cable assembly part number

| Layout | Description                        | Connector and Overmould type |                | Length*       |               |
|--------|------------------------------------|------------------------------|----------------|---------------|---------------|
|        |                                    | Connector                    | Overmould type | 1m            | 2m            |
| 103G1  | In line overmoulded cable assembly | Male In line receptacle      | Straight       | HAUTL13G1PS1M | HAUTL13G1PS2M |
|        |                                    | Male In line receptacle      | Right angle    | HAUTL13G1PR1M | HAUTL13G1PR2M |
|        |                                    | Female In line receptacle    | Straight       | HAUTL13G1SS1M | HAUTL13G1SS2M |
|        |                                    | Female In line receptacle    | Right angle    | HAUTL13G1SR1M | HAUTL13G1SR2M |
|        | Plug overmoulded cable assembly    | Male plug                    | Straight       | HAUTL63G1PS1M | HAUTL63G1PS2M |
|        |                                    | Male plug                    | Right angle    | HAUTL63G1PR1M | HAUTL63G1PR2M |
|        |                                    | Female plug                  | Straight       | HAUTL63G1SS1M | HAUTL63G1SS2M |
|        |                                    | Female plug                  | Right angle    | HAUTL63G1SR1M | HAUTL63G1SR2M |

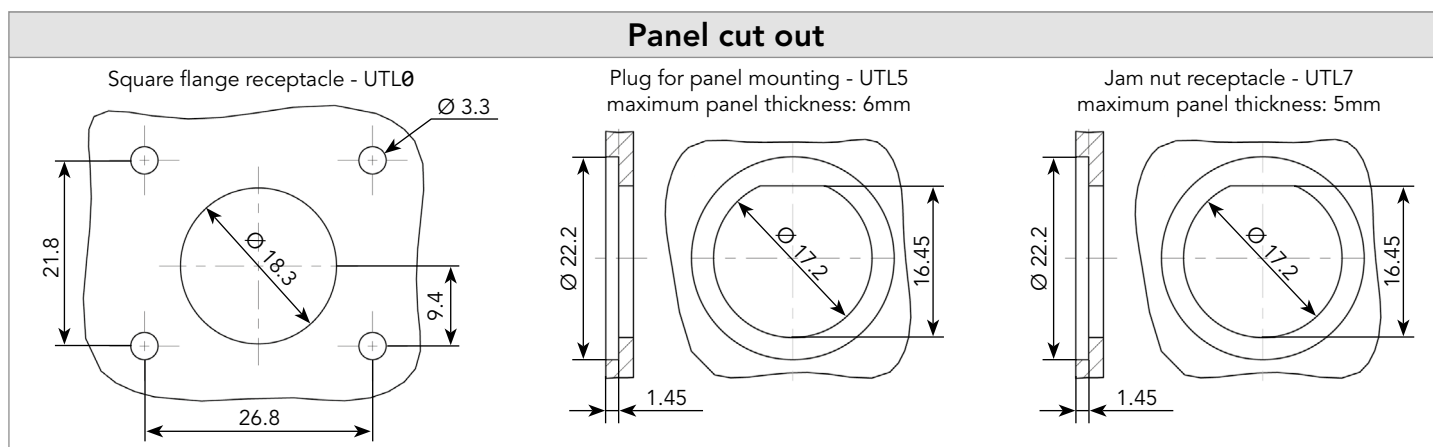
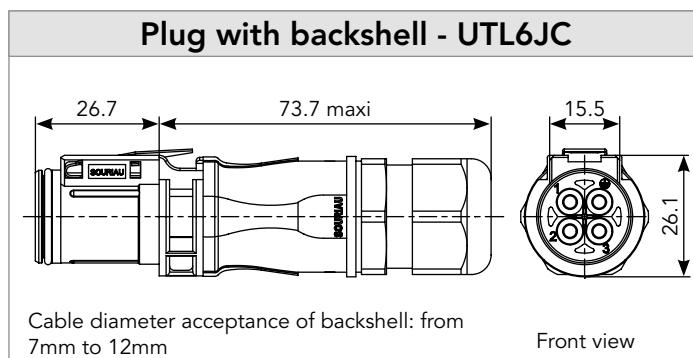
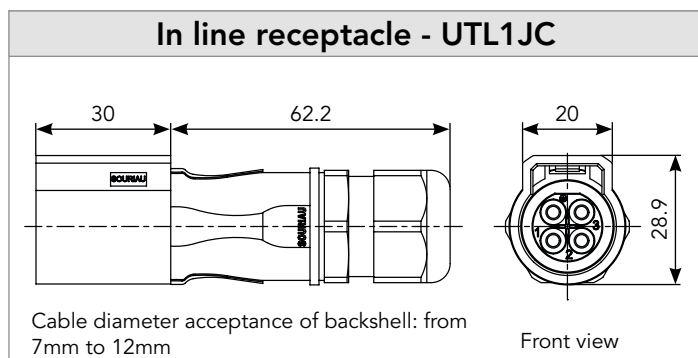
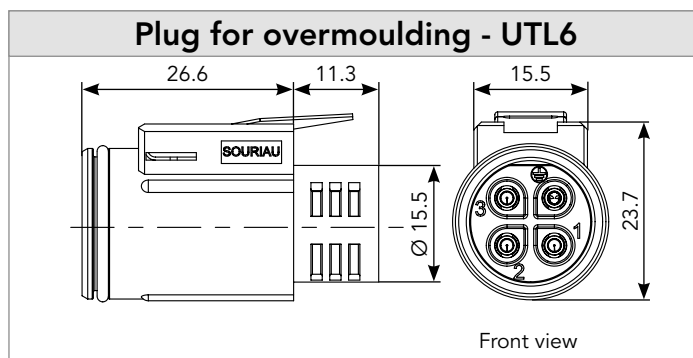
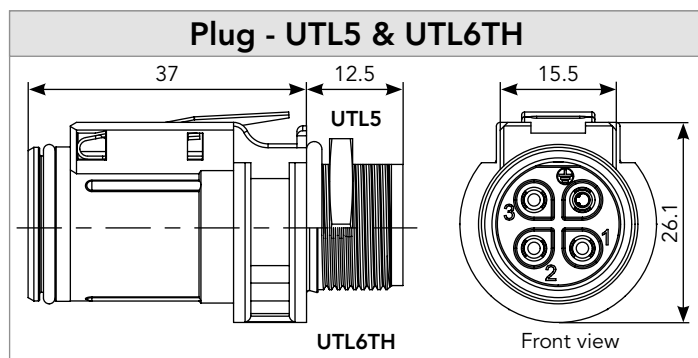
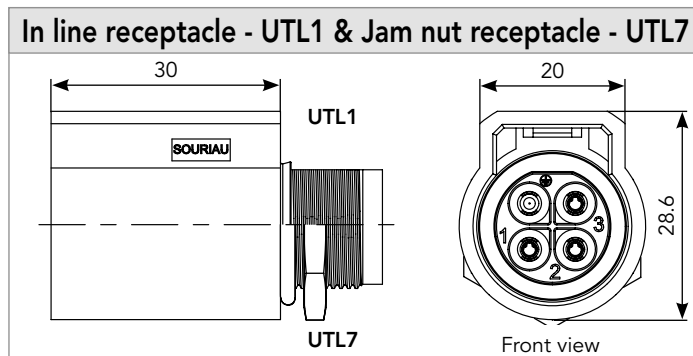
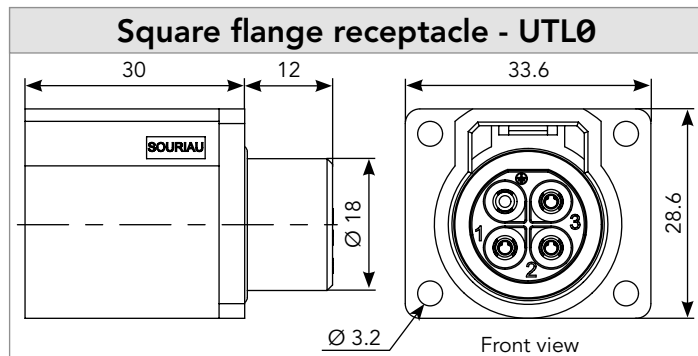
\* : Other lengths or specific design requirement please consult us

## Evaluation kit

Evaluation kit is composed of 1 connector, contacts and 1 heat shrink boot for a quick and easy assembly production. For more information please see page 67.

## 103G1 (shell size 10, 3 + ground, 4x#16)

### Dimensions (for mated connector lengths see page 65)



Note: all dimensions are in mm and for information only

## 103G1 (shell size 10, 3 + ground, 4x#16)

### Accessories and tooling

**Dustcap for plug**

IP67



Part number  
UTL610DCG

**Dustcap for receptacle**

IP67



Part number  
UTL10DCG

**Handle (without head)**



Part number  
SHANDLES

**Tool kit**



Part number  
TOOLKIT

**Dustcap for male receptacle**

IP68/69K



Part number  
UTL103G1PDCG68

**Dustcap for female receptacle**

IP68/69K



Part number  
UTL103G1SDCG68

**Extraction tool #16**



Part number  
RX2025GE1

**Insertion tool #16**



Part number  
RTM205

**Cable gland backshell\***



Part number  
UTL10JC

**Backshell housing\***



Part number  
UTL10JCP1

\* Backshells delivered with UTL10SEAL for sealing with plug or receptacle

**O-ring**



Part number  
UTL10SEAL

**Nut**



Part number  
UTL10NUT

**Head crimp tooling (without handle)**

| Contacts                       | Contact size                        | Part number of head |
|--------------------------------|-------------------------------------|---------------------|
| RM/RC 28M1K <sup>(1)</sup>     | Standard contacts<br>#16<br>Ø 1.6mm | S16RCM20*           |
| RM/RC 24M9K <sup>(1)</sup>     |                                     | S16RCM20*           |
| RM/RC 20M13K <sup>(1)</sup>    |                                     | S16RCM20*           |
| RM/RC 20M12K <sup>(1)</sup>    |                                     | S16RCM20*           |
| RM/RC 16M23K <sup>(1)</sup>    |                                     | S16RCM16*           |
| RM/RC 14M30K <sup>(1)</sup>    |                                     | S16RCM14*           |
| SM/SC 24ML1TK6 <sup>(1)</sup>  |                                     | S16SCM20*           |
| SM/SC 20ML1TK6 <sup>(1)</sup>  |                                     | S16SCM20*           |
| SM/SC 16ML1TK6 <sup>(1)</sup>  |                                     | S16SCML1*           |
| SM/SC 14ML1TK6 <sup>(1)</sup>  |                                     | S16SCML1*           |
| SM/SC 16ML11TK6 <sup>(1)</sup> |                                     | S16SCML11*          |
| RM/RC 16M25K                   |                                     | S16RCM1625*         |
| RM/RC 14M25K                   |                                     | S16RCM1425*         |
| RMDXK10D28K                    | Coaxial contacts<br>#16<br>Ø 1.6mm  | M20S-1J             |
| RCDXK1D28K                     |                                     |                     |
| RM/RC DX60xxD28K               |                                     |                     |
| RM/RC DXK10D28 + YORX090       |                                     |                     |
| RM/RC DX60xxD28                |                                     |                     |

(1): Example of plating, for other plating options see page 38  
\* Heads to be used with handle PN: SHANDLES

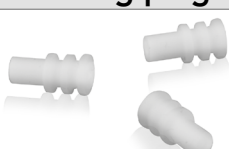


**Protective shroud**



Part number  
UTL610PS

**Sealing plug**



Part number  
SWSFILLERPLUG

Can be used only with UTL5, UTL6JC, UTL6TH

See instruction page 59

# 103G1 (shell size 10, 3 + ground, 4x#16)

## Contacts

| #16      | Contact type                                                     | AWG         | Part number                  |                              | Max wire Ø | Max insulator Ø |
|----------|------------------------------------------------------------------|-------------|------------------------------|------------------------------|------------|-----------------|
|          |                                                                  |             | Male                         | Female                       |            |                 |
| Crimp    | Machined                                                         | 30-28       | RM28M1K <sup>(1)</sup>       | RC28M1K <sup>(1)</sup>       | 0.55       | 1.00            |
|          |                                                                  | 26-24       | RM24M9K <sup>(1)</sup>       | RC24M9K <sup>(1)</sup>       | 0.80       | 1.60            |
|          |                                                                  | 22-20       | RM20M13K <sup>(1)</sup>      | RC20M13K <sup>(1)</sup>      | 1.15       | 1.80            |
|          |                                                                  | 22-20       | RM20M12K <sup>(1)</sup>      | RC20M12K <sup>(1)</sup>      | 1.15       | 2.20            |
|          |                                                                  | 20-16       | RM16M23K <sup>(1)</sup>      | RC16M23K <sup>(1)</sup>      | 1.80       | 3.20            |
|          |                                                                  | 16-14       | RM14M30K <sup>(1)</sup>      | RC14M30K <sup>(1)</sup>      | 2.30       | 3.20            |
|          | Machined sealed<br>(with O-Ring for IP68/69K unmated)            | 20-16       | RM16M25K                     | RC16M25K                     | 1.80       | 3.20            |
|          |                                                                  | 16-14       | RM14M25K                     | RC14M25K                     | 2.28       | 3.20            |
|          |                                                                  | 24          | RM24M25K <sup>(3)</sup>      | RC24M25K <sup>(3)</sup>      | 0.65       | 3.20            |
|          | Stamped & Formed reeled contacts<br>See note (2) for loose piece | 26-24       | SM24M1TK6 <sup>(1)(2)</sup>  | SC24M1TK6 <sup>(1)(2)</sup>  | -          | 0.90-1.60       |
|          |                                                                  | 22-20       | SM20M1TK6 <sup>(1)(2)</sup>  | SC20M1TK6 <sup>(1)(2)</sup>  | -          | 1.20-2.10       |
|          |                                                                  | 18-16       | SM16M1TK6 <sup>(1)(2)</sup>  | SC16M1TK6 <sup>(1)(2)</sup>  | -          | 3.20            |
|          |                                                                  | 18-16       | SM16M11TK6 <sup>(1)(2)</sup> | SC16M11TK6 <sup>(1)(2)</sup> | -          | 3.00            |
|          |                                                                  | 14          | SM14M1TK6 <sup>(1)(2)</sup>  | SC14M1TK6 <sup>(1)(2)</sup>  | -          | 3.20            |
| Coaxial* | Cable multipiece                                                 | see page 41 | RMDXK10D28                   | RCDXK1D28                    | -          | -               |
|          | Cable monocrimp                                                  |             | RMDX60xxD28                  | RCDX60xxD28                  | -          | -               |
|          | Twisted pair multipiece                                          |             | RMDXK10D28 + YORX090         | RCDXK1D28 + YORX090          | -          | -               |
|          | Twisted pair monocrimp                                           |             | RMDX60xxD28                  | RCDX60xxD28                  | -          | -               |
| PCB      | For male insert                                                  | -           | RM20M12E8K                   | RC20M12E84K                  | -          | -               |
|          | For female insert                                                | -           | RM20M12E8K                   | RC20M12E83K                  | -          | -               |

(1): Example of plating, for other plating options see page 38 / (2): For loose piece contact packaging, place "L" in part number. Example: SM20ML1TK6

Note: all dimensions are in mm

(3): Includes RM/RC24M25K contacts + a ferrule RR24M1K. The ferrule can also be ordered separately. See page 53

\*: Coax contacts cannot be used in the ground cavity

### REMINDER

Plugs and receptacles have to be equipped with both contact genders.

EX: UTL6103G1P = 3 x SM16M1TK6 (signal) + 1 x SC16M1TK6 (ground)

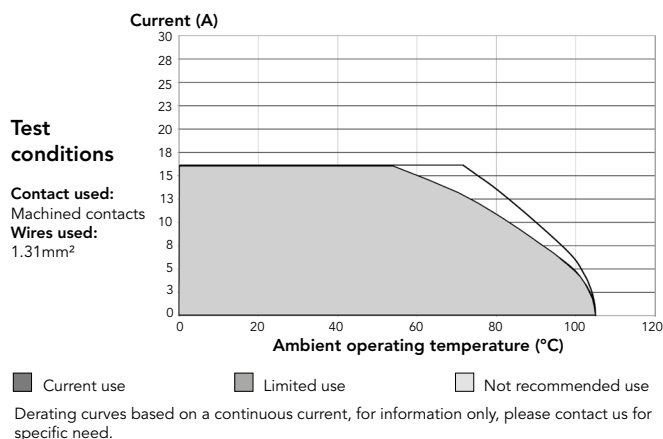
### Electrical characteristics

**UL**  
16A 600V V0  
13A 277V for CBC use

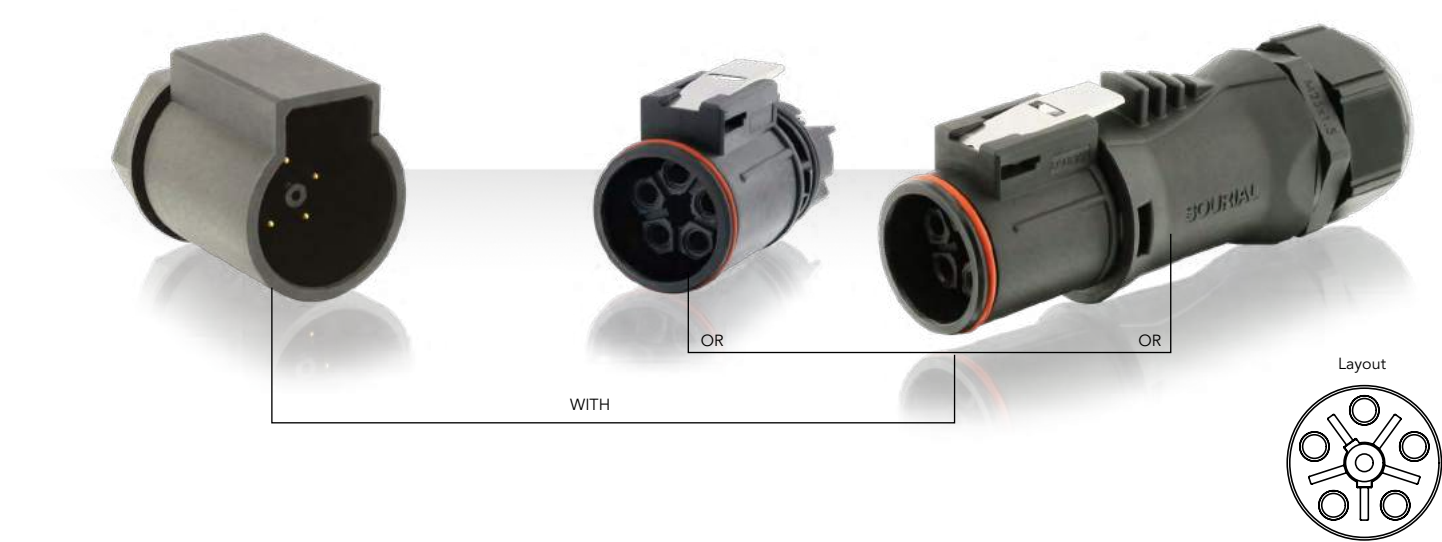
**CN**  
13A 600V  
10A 277V for CBC use

**IEC**  
16A 500V 6KV 4  
13A 250V 4KV 4 for CBC use

### UTS 103 derating curves



145 (shell size 14, 5x#16)



Connector part number

| Contact type                                                   | Connector type            | Part number |               |
|----------------------------------------------------------------|---------------------------|-------------|---------------|
|                                                                |                           | Male insert | Female insert |
| Crimp contacts<br>to be ordered<br>separately see page 25      | Plug with backshell*      | -           | UTL6JC145S    |
|                                                                | Plug without backshell    | -           | UTL6145S      |
|                                                                | Jam-nut without backshell | UTL7145P    | -             |
| Screw termination<br>contacts, delivered<br>with connector (1) | Plug with backshell*      | -           | UTL6JC145SSCR |
|                                                                | Plug without backshell    | -           | UTL6145SSCR   |

\* Non removable backshell when mated. IP68/69K not guaranteed if backshell removed.  
1: Screw termination version (from AWG18 to AWG14) or crimp version.  
Standard delivered packaging: individual bag. For bulk delivery of 100 pcs please add a "B" after the P or S (connector gender) and before the potential "03" digits.

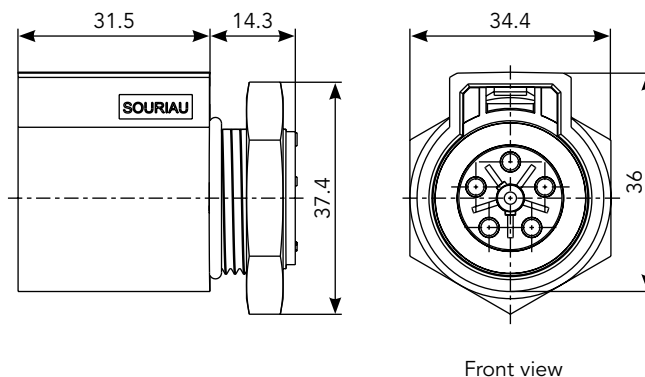
Overmoulded cable assembly

Please consult us.

**145** (shell size 14, 5x#16)

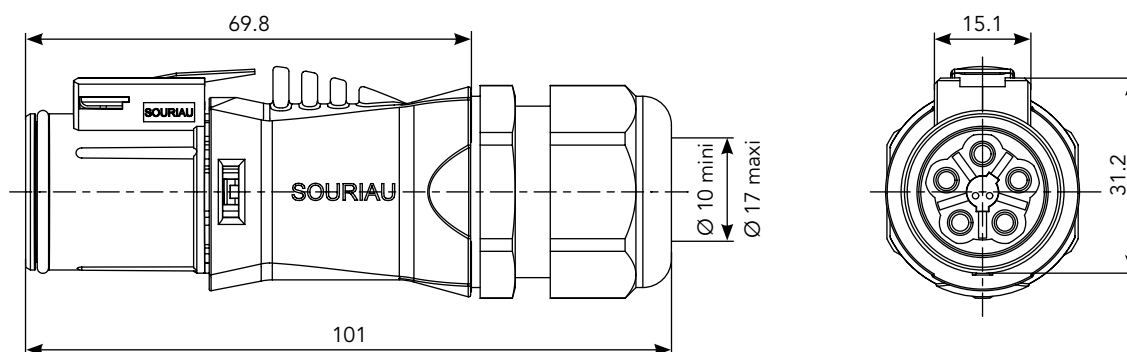
**Dimensions** (for mated connector lengths see page 66)

### Jam nut receptacle - UTL7



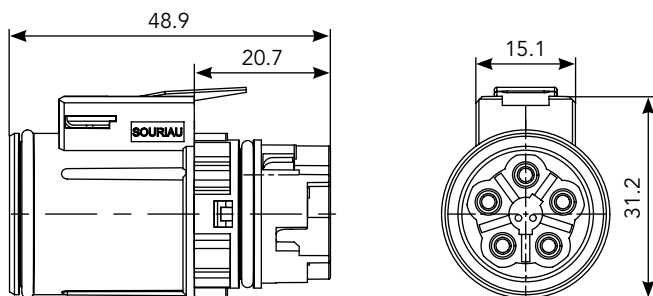
Front view

### Plug with backshell - UTL6



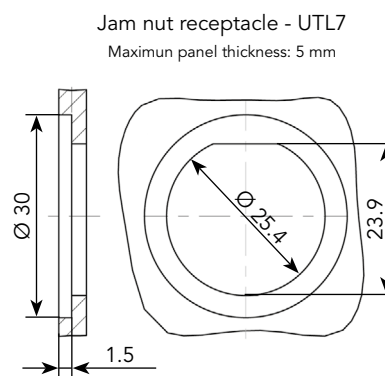
Front view

### Plug without backshell - UTL6



Front view

### Panel cut out



Jam nut receptacle - UTL7  
Maximum panel thickness: 5 mm

Note: all dimensions are in mm and for information only

# UTL Series Connector

**145** (shell size 14, 5x#16)

## Tooling

**Handle (without head)**



|             |
|-------------|
| Part number |
| SHANDLES    |

**Tool kit**



|             |
|-------------|
| Part number |
| TOOLKIT     |

| Head crimp tooling (without handle) |                                     |                     |
|-------------------------------------|-------------------------------------|---------------------|
| Contacts                            | Contact size                        | Part number of head |
| RM/RC 28M1K <sup>(1)</sup>          | Standard contacts<br>#16<br>Ø 1.6mm | S16RCM20*           |
| RM/RC 24M9K <sup>(1)</sup>          |                                     | S16RCM20*           |
| RM/RC 20M13K <sup>(1)</sup>         |                                     | S16RCM20*           |
| RM/RC 20M12K <sup>(1)</sup>         |                                     | S16RCM20*           |
| RM/RC 16M23K <sup>(1)</sup>         |                                     | S16RCM16*           |
| RM/RC 14M30K <sup>(1)</sup>         |                                     | S16RCM14*           |
| SM/SC 24ML1TK6 <sup>(1)</sup>       |                                     | S16SCM20*           |
| SM/SC 20ML1TK6 <sup>(1)</sup>       |                                     | S16SCM20*           |
| SM/SC 16ML1TK6 <sup>(1)</sup>       |                                     | S16SCML1*           |
| SM/SC 14ML1TK6 <sup>(1)</sup>       |                                     | S16SCML1*           |
| SM/SC 16ML11TK6 <sup>(1)</sup>      |                                     | S16SCML11*          |

(1): Example of plating, for other plating options see page 38  
 \* Heads to be used with handle PN: SHANDLES



**Extraction tool #16**



|             |
|-------------|
| Part number |
| RX2025GE1   |

**Insertion tool #16**



|             |
|-------------|
| Part number |
| RTM205      |

## Accessories

**Backshell**



|             |
|-------------|
| Part number |
| UTL14JC     |

**Backshell**



|             |
|-------------|
| Part number |
| UTL14JCP1   |

**145** (shell size 14, 5x#16)

## Contacts

| #16      | Contact type                                                     | AWG         | Part number                  |                              | Max wire Ø | Max insulator Ø |
|----------|------------------------------------------------------------------|-------------|------------------------------|------------------------------|------------|-----------------|
|          |                                                                  |             | Male                         | Female                       |            |                 |
| Crimp    | Machined                                                         | 30-28       | RM28M1K <sup>(1)</sup>       | RC28M1K <sup>(1)</sup>       | 0.55       | 1.00            |
|          |                                                                  | 26-24       | RM24M9K <sup>(1)</sup>       | RC24M9K <sup>(1)</sup>       | 0.80       | 1.60            |
|          |                                                                  | 22-20       | RM20M13K <sup>(1)</sup>      | RC20M13K <sup>(1)</sup>      | 1.15       | 1.80            |
|          |                                                                  | 22-20       | RM20M12K <sup>(1)</sup>      | RC20M12K <sup>(1)</sup>      | 1.15       | 2.20            |
|          |                                                                  | 20-16       | RM16M23K <sup>(1)</sup>      | RC16M23K <sup>(1)</sup>      | 1.80       | 3.20            |
|          |                                                                  | 16-14       | RM14M30K <sup>(1)</sup>      | RC14M30K <sup>(1)</sup>      | 2.30       | 3.20            |
|          | Machined sealed<br>(with O-Ring for IP68/69K unmated)            | 20-16       | RM16M25K                     | RC16M25K                     | 1.80       | 3.20            |
|          |                                                                  | 16-14       | RM14M25K                     | RC14M25K                     | 2.28       | 3.20            |
|          |                                                                  | 24          | RM24M25K <sup>(3)</sup>      | RC24M25K <sup>(3)</sup>      | 0.65       | 3.20            |
|          | Stamped & Formed reeled contacts<br>See note (2) for loose piece | 26-24       | SM24M1TK6 <sup>(1)(2)</sup>  | SC24M1TK6 <sup>(1)(2)</sup>  | -          | 0.90-1.60       |
|          |                                                                  | 22-20       | SM20M1TK6 <sup>(1)(2)</sup>  | SC20M1TK6 <sup>(1)(2)</sup>  | -          | 1.20-2.10       |
|          |                                                                  | 18-16       | SM16M1TK6 <sup>(1)(2)</sup>  | SC16M1TK6 <sup>(1)(2)</sup>  | -          | 3.20            |
|          |                                                                  | 18-16       | SM16M11TK6 <sup>(1)(2)</sup> | SC16M11TK6 <sup>(1)(2)</sup> | -          | 3.00            |
|          |                                                                  | 14          | SM14M1TK6 <sup>(1)(2)</sup>  | SC14M1TK6 <sup>(1)(2)</sup>  | -          | 3.20            |
| Coaxial* | Cable multipiece                                                 | see page 41 | RMDXK10D28                   | RCDXK1D28                    | -          | -               |
|          | Cable monocrimp                                                  |             | RMDX60xxD28                  | RCDX60xxD28                  | -          | -               |
|          | Twisted pair multipiece                                          |             | RMDXK10D28 + YORX090         | RCDXK1D28 + YORX090          | -          | -               |
|          | Twisted pair monocrimp                                           |             | RMDX60xxD28                  | RCDX60xxD28                  | -          | -               |

(1): Example of plating, for other plating options see page 38

(2): For loose piece contact packaging, place "L" in part number. Example: **SM20ML1TK6**

(3): Includes RM/RC24M25K contacts + a ferrule RR24M1K. The ferrule can also be ordered separately. See page 53

\*: Coax contacts cannot be used in the ground cavity

Note: all dimensions are in mm

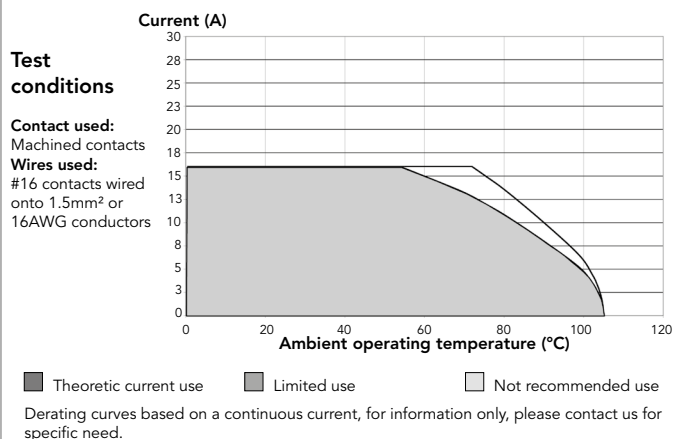
### Electrical characteristics

**UL**  
16A 600V V0  
13A 277V for CBC use

**CN**  
13A 600V  
10A 277V for CBC use

**IEC**  
16A 500V 4KV 4  
13A 250V 2.5KV 4 for CBC use

### UTL145 derating curves



## 102G1W3 (shell size 10, 3x#16 + 3x#20)



## Connector part number

Plugs and receptacles have to be equipped with both contact genders. Ground lines will never be equipped with the same contacts as the neutral and phase.

| Contact type                                   | Connector type                         | Part number      |                  |
|------------------------------------------------|----------------------------------------|------------------|------------------|
|                                                |                                        | Male insert      | Female insert    |
|                                                |                                        | Black color      | Black color      |
| Crimp contacts supplied separately see page 29 | Plug                                   | UTL6102G1W3P     | UTL6102G1W3S     |
|                                                | Jam nut receptacle                     | UTL7102G1W3P     | UTL7102G1W3S     |
|                                                | In line receptacle                     | UTL1102G1W3P     | UTL1102G1W3S     |
| Contacts included                              | Terminating Resistor plug - 120Ω       | UTL6102G1W3PCDMX | UTL6102G1W3SCDMX |
|                                                | Terminating Resistor receptacle - 120Ω | UTL1102G1W3PCDMX | UTL1102G1W3SCDMX |

The Terminating Resistor is only designed to ensure the 120 Ohms impedance on the signal lines, no contact loaded in the power positions.

#20 contacts and plastic plate are not removable.

Standard delivered packaging: individual bag. For bulk delivery of 100 pcs please add a "B" after the P or S (connector gender) and before the potential "03" digits.

## Overmoulded cable assembly part number

| Layout  | Description                        | Connector and Overmould type |                | Length*         |                 |
|---------|------------------------------------|------------------------------|----------------|-----------------|-----------------|
|         |                                    | Connector                    | Overmould type | 1m              | 2m              |
| 102G1W3 | In line overmoulded cable assembly | Male In line receptacle      | Straight       | HAUTL12G1W3PS1M | HAUTL12G1W3PS2M |
|         |                                    | Male In line receptacle      | Right angle    | HAUTL12G1W3PR1M | HAUTL12G1W3PR2M |
|         |                                    | Female In line receptacle    | Straight       | HAUTL12G1W3SS1M | HAUTL12G1W3SS2M |
|         |                                    | Female In line receptacle    | Right angle    | HAUTL12G1W3SR1M | HAUTL12G1W3SR2M |
|         | Plug overmoulded cable assembly    | Male plug                    | Straight       | HAUTL62G1W3PS1M | HAUTL62G1W3PS2M |
|         |                                    | Male plug                    | Right angle    | HAUTL62G1W3PR1M | HAUTL62G1W3PR2M |
|         |                                    | Female plug                  | Straight       | HAUTL62G1W3SS1M | HAUTL62G1W3SS2M |
|         |                                    | Female plug                  | Right angle    | HAUTL62G1W3SR1M | HAUTL62G1W3SR2M |

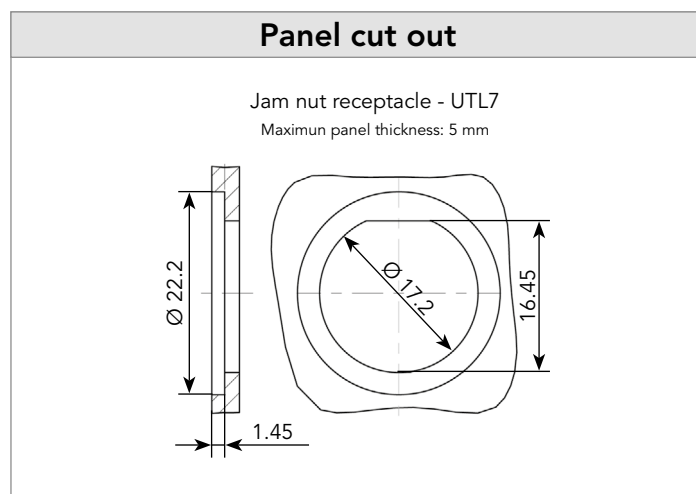
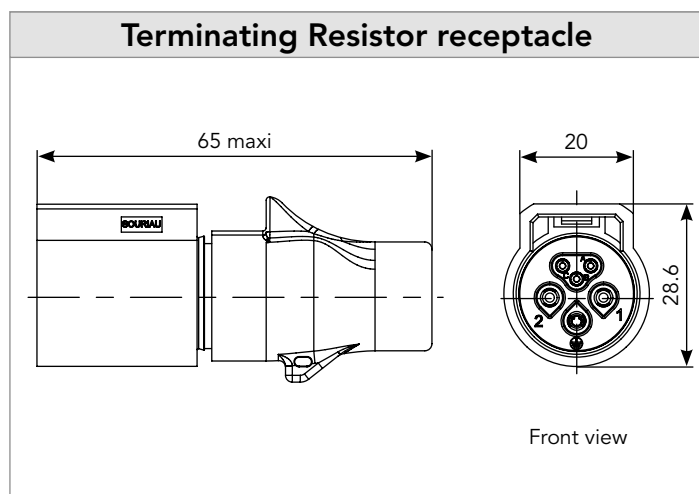
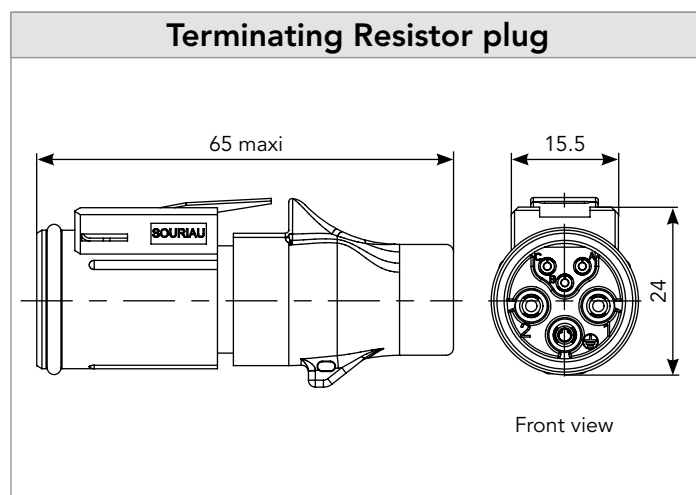
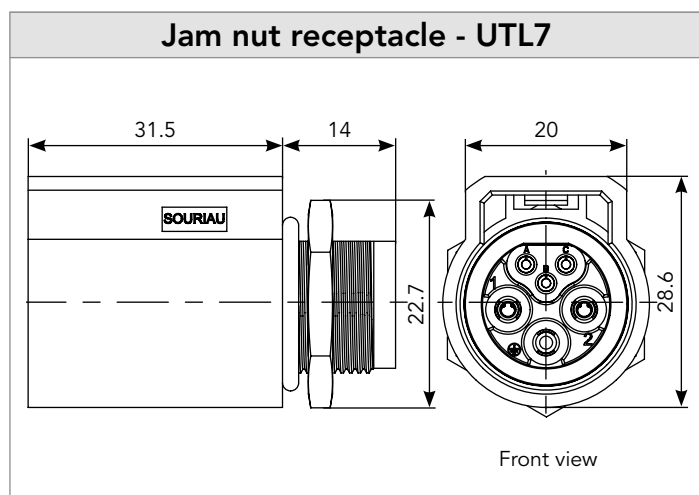
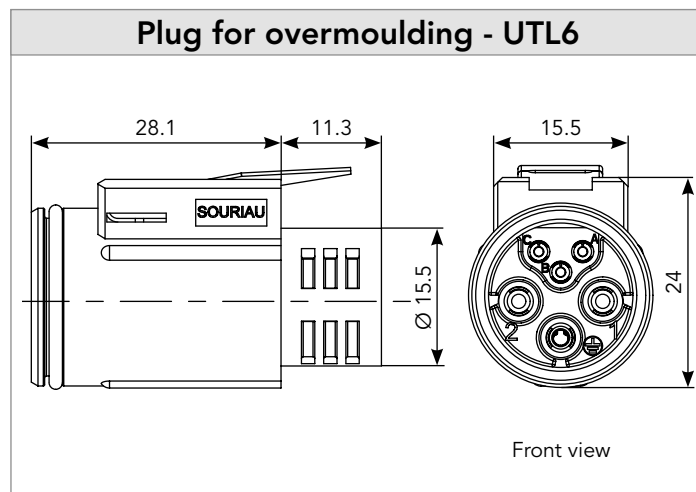
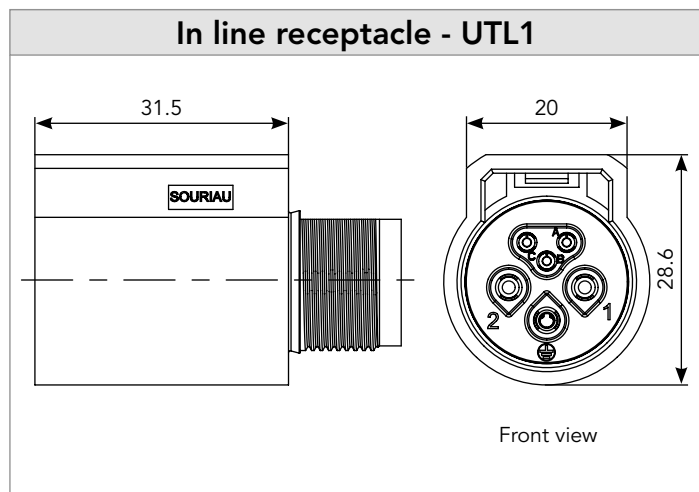
\* : Other lengths or specific design requirement please consult us

## Evaluation kit

Evaluation kit is composed of 1 connector, contacts and 1 heat shrink boot for a quick and easy assembly production. For more information please see page 68.

# 102G1W3 (shell size 10, 3x#16 + 3x#20)

## Dimensions (for mated connector lengths see page 65)



Note: all dimensions are in mm and for information only

**102G1W3** (shell size 10, 3x#16 + 3x#20)

## Accessories and tooling

**Dustcap for plug**

IP67



Part number  
UTL610DCG

**Dustcap for receptacle**

IP67



Part number  
UTL10DCG

**Handle** (without head)



Part number  
SHANGLES

**Tool kit**



Part number  
TOOLKIT

**Dustcap for male receptacle**

IP68/69K



Part number  
UTL102G1W3PDCG68

**Dustcap for female receptacle**

IP68/69K



Part number  
UTL102G1W3SDCG68

**Extraction tool #16**



Part number  
RX2025GE1

**Insertion tool #16**



Part number  
RTM205

**Extraction tool #20**



Part number  
RX20D44

| Head crimp tooling (without handle) |                                     |                     |
|-------------------------------------|-------------------------------------|---------------------|
| Contacts                            | Contact size                        | Part number of head |
| RM/RC 24W3K <sup>(1)</sup>          | Standard contacts<br>#20<br>Ø 1mm   | S20RCM*             |
| RM/RC 20W3K <sup>(1)</sup>          |                                     | S20RCM*             |
| RM/RC 18W3K <sup>(1)</sup>          |                                     | S20RCM*             |
| SM/SC 24WL3 <sup>(1)(2)</sup>       |                                     | S20SCM20*           |
| SM/SC 20WL3 <sup>(1)(2)</sup>       |                                     | S20SCM20*           |
| RM/RC 28M1K <sup>(1)</sup>          | Standard contacts<br>#16<br>Ø 1.6mm | S16RCM20*           |
| RM/RC 24M9K <sup>(1)</sup>          |                                     | S16RCM20*           |
| RM/RC 20M13K <sup>(1)</sup>         |                                     | S16RCM20*           |
| RM/RC 20M12K <sup>(1)</sup>         |                                     | S16RCM20*           |
| RM/RC 16M23K <sup>(1)</sup>         |                                     | S16RCM16*           |
| RM/RC 14M30K <sup>(1)</sup>         |                                     | S16RCM14*           |
| SM/SC 24ML1TK6 <sup>(1)</sup>       |                                     | S16SCM20*           |
| SM/SC 20ML1TK6 <sup>(1)</sup>       |                                     | S16SCM20*           |
| SM/SC 16ML1TK6 <sup>(1)</sup>       |                                     | S16SCML1*           |
| SM/SC 14ML1TK6 <sup>(1)</sup>       |                                     | S16SCML1*           |
| SM/SC 16ML11TK6 <sup>(1)</sup>      |                                     | S16SCML11*          |
| RMDXK10D28K                         | Coaxial contacts<br>#16<br>Ø 1.6mm  | M20S-1J             |
| RCDXK1D28K                          |                                     |                     |
| RM/RC DX60xxD28K                    |                                     |                     |
| RM/RC DXK10D28 + YORX090            |                                     |                     |
| RM/RC DX60xxD28                     |                                     |                     |

(1): Example of plating, for other plating options see page 38

(2): loose contact

\* Heads to be used with handle PN: SHANGLES



# 102G1W3 (shell size 10, 3x#16 + 3x#20)

## Contacts

| #20      | Contact type                                                     | AWG         | Part number                  |                              | Max wire Ø | Max insulator Ø |
|----------|------------------------------------------------------------------|-------------|------------------------------|------------------------------|------------|-----------------|
|          |                                                                  |             | Male                         | Female                       |            |                 |
| Crimp    | Machined                                                         | 26-24       | RM24W3K <sup>(1)</sup>       | RC24W3K <sup>(1)</sup>       | 0.80       | 1.60            |
|          |                                                                  | 22-20       | RM20W3K <sup>(1)</sup>       | RC20W3K <sup>(1)</sup>       | 1.15       | 1.60            |
|          |                                                                  | 20-18       | RM18W3K <sup>(1)</sup>       | RC18W3K <sup>(1)</sup>       | 1.30       | 2.10            |
|          | Stamped & Formed reeled contacts<br>See note (2) for loose piece | 26-24       | SM24W3TK6 <sup>(1)(2)</sup>  | SC24W3TK6 <sup>(1)(2)</sup>  | -          | 0.90-1.60       |
|          |                                                                  | 26-24       | SM24W3S26 <sup>(1)(2)</sup>  | SC24W3S25 <sup>(1)(2)</sup>  | -          | 0.90-1.60       |
|          |                                                                  | 22-20       | SM20W3TK6 <sup>(1)(2)</sup>  | SC20W3TK6 <sup>(1)(2)</sup>  | -          | 1.20-2.10       |
|          |                                                                  | 22-20       | SM20W3S26 <sup>(1)(2)</sup>  | SC20W3S25 <sup>(1)(2)</sup>  | -          | 1.20-2.10       |
| Crimp    | Machined                                                         | 30-28       | RM28M1K <sup>(1)</sup>       | RC28M1K <sup>(1)</sup>       | 0.55       | 1.00            |
|          |                                                                  | 26-24       | RM24M9K <sup>(1)</sup>       | RC24M9K <sup>(1)</sup>       | 0.80       | 1.60            |
|          |                                                                  | 22-20       | RM20M13K <sup>(1)</sup>      | RC20M13K <sup>(1)</sup>      | 1.15       | 1.80            |
|          |                                                                  | 22-20       | RM20M12K <sup>(1)</sup>      | RC20M12K <sup>(1)</sup>      | 1.15       | 2.20            |
|          |                                                                  | 20-16       | RM16M23K <sup>(1)</sup>      | RC16M23K <sup>(1)</sup>      | 1.80       | 3.20            |
|          |                                                                  | 16-14       | RM14M30K <sup>(1)</sup>      | RC14M30K <sup>(1)</sup>      | 2.30       | 3.20            |
|          | Stamped & Formed reeled contacts<br>See note (2) for loose piece | 26-24       | SM24M1TK6 <sup>(1)(2)</sup>  | SC24M1TK6 <sup>(1)(2)</sup>  | -          | 0.90-1.60       |
|          |                                                                  | 22-20       | SM20M1TK6 <sup>(1)(2)</sup>  | SC20M1TK6 <sup>(1)(2)</sup>  | -          | 1.20-2.10       |
|          |                                                                  | 18-16       | SM16M1TK6 <sup>(1)(2)</sup>  | SC16M1TK6 <sup>(1)(2)</sup>  | -          | 3.20            |
|          |                                                                  | 18-16       | SM16M11TK6 <sup>(1)(2)</sup> | SC16M11TK6 <sup>(1)(2)</sup> | -          | 3.00            |
|          |                                                                  | 14          | SM14M1TK6 <sup>(1)(2)</sup>  | SC14M1TK6 <sup>(1)(2)</sup>  | -          | 3.20            |
| Coaxial* | Cable multipiece                                                 | see page 41 | RMDXK10D28                   | RCDXK1D28                    | -          | -               |
|          | Cable monocrimp                                                  |             | RMDX60xxD28                  | RCDX60xxD28                  | -          | -               |
|          | Twisted pair multipiece                                          |             | RMDXK10D28 + YORX090         | RCDXK1D28 + YORX090          | -          | -               |
|          | Twisted pair monocrimp                                           |             | RMDX60xxD28                  | RCDX60xxD28                  | -          | -               |

(1): Example of plating, for other plating options see page 38

(2): For loose piece contact packaging, place "L" in part number. Example: SM20ML1TK6

\*: Coax contacts cannot be used in the ground cavity

Note: all dimensions are in mm

### REMINDER

Plugs and receptacles have to be equipped with both contact genders.

EX: UTL6102W3G1P = 2 x SM16M1TK6 (power) + 1 x SC16M1TK6 (ground) + 3 x SM20W3TK6 (signal)

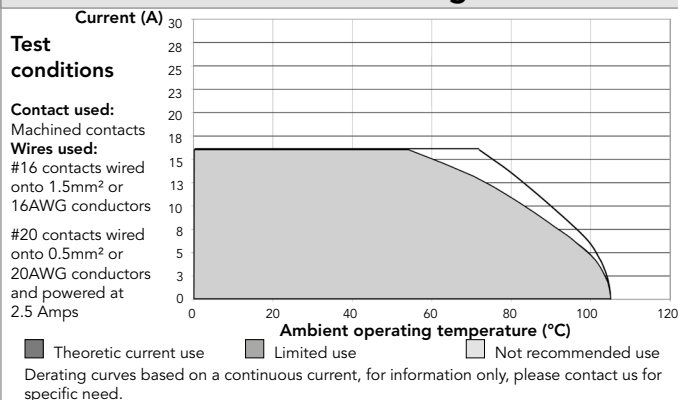
### Electrical characteristics

**UL**  
16A 600V V0  
13A 277V for CBC use

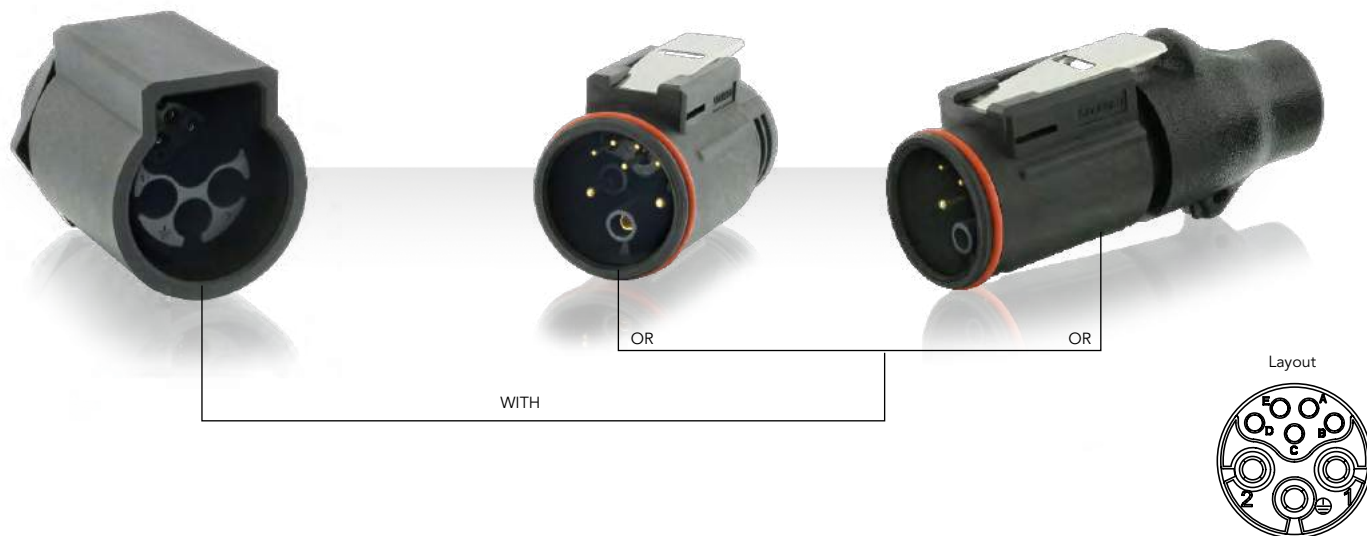
**CN**  
13A 600V  
10A 277V for CBC use

**IEC**  
16A 500V 6KV 4  
13A 250V 4KV 4 for CBC use

### UTL102G1W3 derating curves



## 122G1W5 (shell size 12, 3x#16 + 5x#20)



## Connector part number

Plugs and receptacles have to be equipped with both contact genders. Ground lines will never be equipped with the same contacts as the neutral and phase.

| Contact type                                   | Connector type                         | Part number                    |                                |
|------------------------------------------------|----------------------------------------|--------------------------------|--------------------------------|
|                                                |                                        | Male insert with female ground | Female insert with male ground |
| Crimp contacts supplied separately see page 33 | Plug                                   | UTL6122G1W5P                   | UTL6122G1W5S                   |
|                                                | Jam nut receptacle                     | UTL7122G1W5P                   | UTL7122G1W5S                   |
|                                                | In line receptacle                     | UTL1122G1W5P                   | UTL1122G1W5S                   |
| Contacts included                              | Terminating Resistor plug - 120Ω       | UTL6122G1W5PCDMX               | UTL6122G1W5SCDMX               |
|                                                | Terminating Resistor receptacle - 120Ω | UTL1122G1W5PCDMX               | UTL1122G1W5SCDMX               |

The Terminating Resistor is only designed to ensure the 120 Ohms impedance on the signal lines, no contact loaded in the power positions.

#20 contacts and plastic plate are not removable.

Standard delivered packaging: individual bag. For bulk delivery of 100 pcs please add a "B" after the P or S (connector gender) and before the potential "03" digits.

## Overmoulded cable assembly part number

| Layout  | Description                        | Connector and Overmould type |                | Length*         |                 |
|---------|------------------------------------|------------------------------|----------------|-----------------|-----------------|
|         |                                    | Connector                    | Overmould type | 1m              | 2m              |
| 122G1W5 | In line overmoulded cable assembly | Male In line receptacle      | Straight       | HAUTL12G1W5PS1M | HAUTL12G1W5PS2M |
|         |                                    | Female In line receptacle    | Straight       | HAUTL12G1W5SS1M | HAUTL12G1W5SS2M |
|         | Plug overmoulded cable assembly    | Male plug                    | Straight       | HAUTL62G1W5PS1M | HAUTL62G1W5PS2M |
|         |                                    | Female plug                  | Straight       | HAUTL62G1W5SS1M | HAUTL62G1W5SS2M |

\* : Other lengths or specific design requirement please consult us

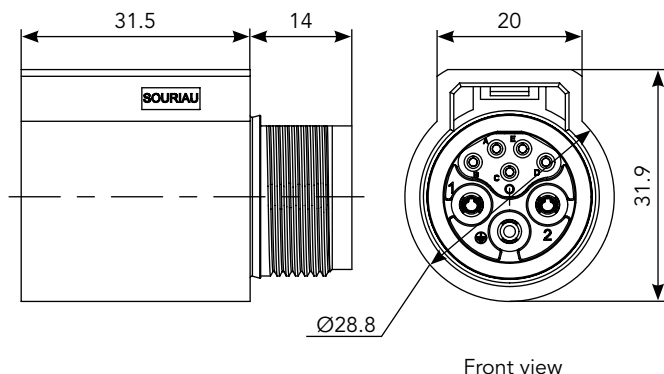
## Evaluation kit

Evaluation kit is composed of 1 connector, contacts and 1 heat shrink boot for a quick and easy assembly production. For more information please see page 69.

# 122G1W5 (shell size 12, 3x#16 + 5x#20)

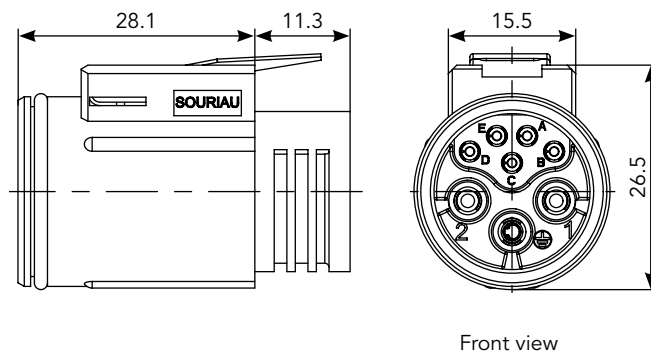
## Dimensions (for mated connector lengths see page 66)

In line receptacle - UTL1



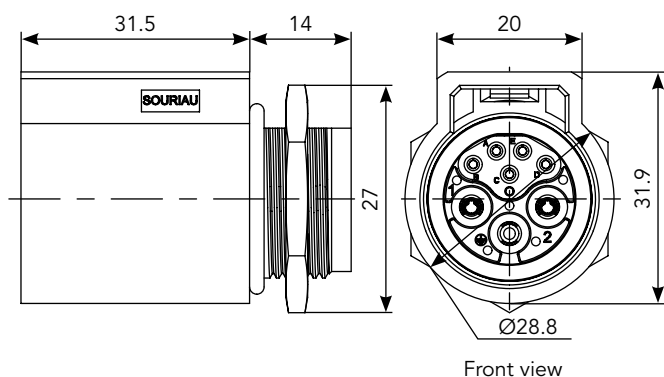
Front view

Plug for overmoulding - UTL6



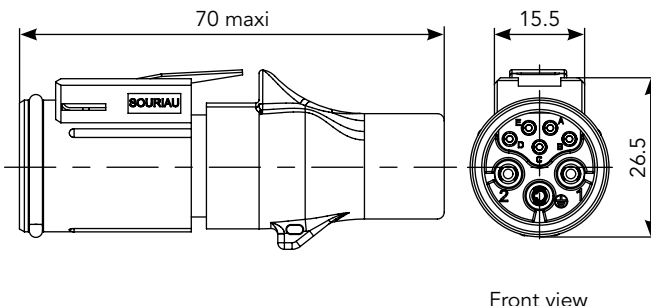
Front view

Jam nut receptacle - UTL7



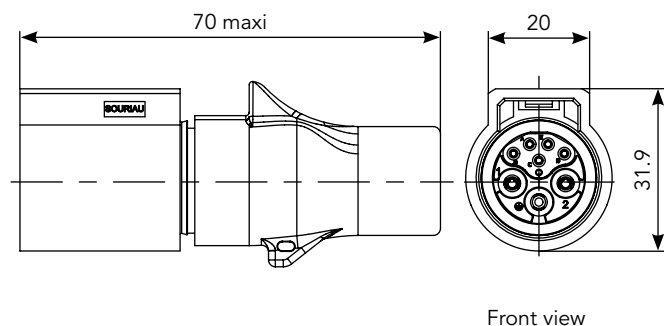
Front view

Terminating Resistor plug



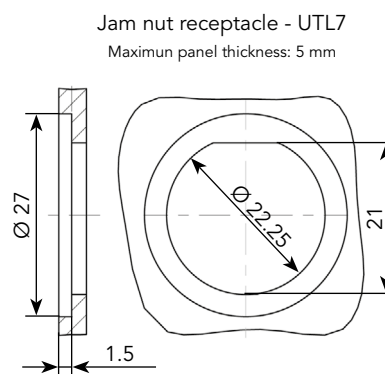
Front view

Terminating Resistor receptacle



Front view

Panel cut out



Note: all dimensions are in mm and for information only

**122G1W5** (shell size 12, 3x#16 + 5x#20)

## Accessories and tooling

**Dustcap for plug**

IP67



Part number  
UTL612DCG

**Dustcap for receptacle**

IP67



Part number  
UTL12DCG

**Handle (without head)**



Part number  
SHANGLES

**Tool kit**



Part number  
TOOLKIT

**Extraction tool #16**



Part number  
RX2025GE1

**Insertion tool #16**



Part number  
RTM205

| Head crimp tooling (without handle) |                                     |                     |
|-------------------------------------|-------------------------------------|---------------------|
| Contacts                            | Contact size                        | Part number of head |
| RM/RC 24W3K <sup>(1)</sup>          | Standard contacts<br>#20<br>Ø 1mm   | S20RCM*             |
| RM/RC 20W3K <sup>(1)</sup>          |                                     | S20RCM*             |
| RM/RC 18W3K <sup>(1)</sup>          |                                     | S20RCM*             |
| SM/SC 24WL3 <sup>(1)(2)</sup>       |                                     | S20SCM20*           |
| SM/SC 20WL3 <sup>(1)(2)</sup>       |                                     | S20SCM20*           |
| RM/RC 28M1K <sup>(1)</sup>          | Standard contacts<br>#16<br>Ø 1.6mm | S16RCM20*           |
| RM/RC 24M9K <sup>(1)</sup>          |                                     | S16RCM20*           |
| RM/RC 20M13K <sup>(1)</sup>         |                                     | S16RCM20*           |
| RM/RC 20M12K <sup>(1)</sup>         |                                     | S16RCM20*           |
| RM/RC 16M23K <sup>(1)</sup>         |                                     | S16RCM16*           |
| RM/RC 14M30K <sup>(1)</sup>         |                                     | S16RCM14*           |
| SM/SC 24ML1TK6 <sup>(1)</sup>       |                                     | S16SCM20*           |
| SM/SC 20ML1TK6 <sup>(1)</sup>       |                                     | S16SCM20*           |
| SM/SC 16ML1TK6 <sup>(1)</sup>       |                                     | S16SCML1*           |
| SM/SC 14ML1TK6 <sup>(1)</sup>       |                                     | S16SCML1*           |
| SM/SC 16ML11TK6 <sup>(1)</sup>      |                                     | S16SCML11*          |
| RMDXK10D28K                         | Coaxial contacts<br>#16<br>Ø 1.6mm  | M20S-1J             |
| RCDXK1D28K                          |                                     |                     |
| RM/RC DX60xxD28K                    |                                     |                     |
| RM/RC DXK10D28 + YORX090            |                                     |                     |
| RM/RC DX60xxD28                     |                                     |                     |

(1): Example of plating, for other plating options see page 38  
 \* Heads to be used with handle PN: SHANGLES (2): loose contact



Handle

+



Head

=



Complete set

**122G1W5** (shell size 12, 3x#16 + 5x#20)**Contacts**

| #20     | Contact type                                                     | AWG         | Part number                  |                              | Max wire Ø | Max insulator Ø |
|---------|------------------------------------------------------------------|-------------|------------------------------|------------------------------|------------|-----------------|
|         |                                                                  |             | Male                         | Female                       |            |                 |
| Crimp   | Machined                                                         | 26-24       | RM24W3K <sup>(1)</sup>       | RC24W3K <sup>(1)</sup>       | 0.80       | 1.60            |
|         |                                                                  | 22-20       | RM20W3K <sup>(1)</sup>       | RC20W3K <sup>(1)</sup>       | 1.15       | 1.60            |
|         |                                                                  | 20-18       | RM18W3K <sup>(1)</sup>       | RC18W3K <sup>(1)</sup>       | 1.30       | 2.10            |
|         | Stamped & Formed reeled contacts<br>See note (2) for loose piece | 26-24       | SM24W3TK6 <sup>(1)(2)</sup>  | SC24W3TK6 <sup>(1)(2)</sup>  | -          | 0.90-1.60       |
|         |                                                                  | 26-24       | SM24W3S26 <sup>(1)(2)</sup>  | SC24W3S25 <sup>(1)(2)</sup>  | -          | 0.90-1.60       |
|         |                                                                  | 22-20       | SM20W3TK6 <sup>(1)(2)</sup>  | SC20W3TK6 <sup>(1)(2)</sup>  | -          | 1.20-2.10       |
|         |                                                                  | 22-20       | SM20W3S26 <sup>(1)(2)</sup>  | SC20W3S25 <sup>(1)(2)</sup>  | -          | 1.20-2.10       |
| Crimp   | Machined                                                         | 30-28       | RM28M1K <sup>(1)</sup>       | RC28M1K <sup>(1)</sup>       | 0.55       | 1.00            |
|         |                                                                  | 26-24       | RM24M9K <sup>(1)</sup>       | RC24M9K <sup>(1)</sup>       | 0.80       | 1.60            |
|         |                                                                  | 22-20       | RM20M13K <sup>(1)</sup>      | RC20M13K <sup>(1)</sup>      | 1.15       | 1.80            |
|         |                                                                  | 22-20       | RM20M12K <sup>(1)</sup>      | RC20M12K <sup>(1)</sup>      | 1.15       | 2.20            |
|         |                                                                  | 20-16       | RM16M23K <sup>(1)</sup>      | RC16M23K <sup>(1)</sup>      | 1.80       | 3.20            |
|         |                                                                  | 16-14       | RM14M30K <sup>(1)</sup>      | RC14M30K <sup>(1)</sup>      | 2.30       | 3.20            |
|         | Stamped & Formed reeled contacts<br>See note (2) for loose piece | 26-24       | SM24M1TK6 <sup>(1)(2)</sup>  | SC24M1TK6 <sup>(1)(2)</sup>  | -          | 0.90-1.60       |
|         |                                                                  | 22-20       | SM20M1TK6 <sup>(1)(2)</sup>  | SC20M1TK6 <sup>(1)(2)</sup>  | -          | 1.20-2.10       |
|         |                                                                  | 18-16       | SM16M1TK6 <sup>(1)(2)</sup>  | SC16M1TK6 <sup>(1)(2)</sup>  | -          | 3.20            |
|         |                                                                  | 18-16       | SM16M11TK6 <sup>(1)(2)</sup> | SC16M11TK6 <sup>(1)(2)</sup> | -          | 3.00            |
|         |                                                                  | 14          | SM14M1TK6 <sup>(1)(2)</sup>  | SC14M1TK6 <sup>(1)(2)</sup>  | -          | 3.20            |
| Coaxial | Cable multipiece                                                 | see page 41 | RMDXK10D28                   | RCDXK1D28                    | -          | -               |
|         | Cable monocrimp                                                  |             | RMDX60xxD28                  | RCDX60xxD28                  | -          | -               |
|         | Twisted pair multipiece                                          |             | RMDXK10D28 + YORX090         | RCDXK1D28 + YORX090          | -          | -               |
|         | Twisted pair monocrimp                                           |             | RMDX60xxD28                  | RCDX60xxD28                  | -          | -               |

(1): Example of plating, for other plating options see page 38

(2): For loose piece contact packaging, place "L" in part number. Example: SM20ML1TK6

\*: Coax contacts cannot be used in the ground cavity

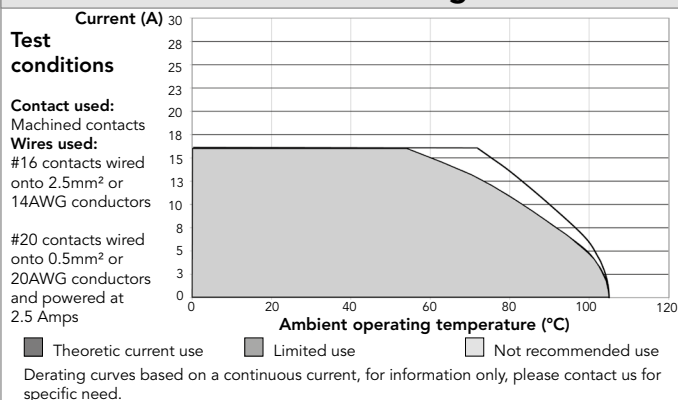
Note: all dimensions are in mm

**REMINDER****Plugs and receptacles have to be equipped with both contact genders.****EX: UTL6122G1W5P = 2 x SM16M1TK6 (power) + 1 x SC16M1TK6 (ground) + 5 x SM20W3TK6 (signal)****Electrical characteristics**

**UL**  
16A 600V V0  
13A 277V for CBC use

**CN**  
13A 600V  
10A 277V for CBC use

**IEC**  
16A 500V 6KV 4  
13A 250V 4KV 4 for CBC use

**UTL122G1W5 derating curves**

# UTL SERIES

# Contacts

|                                        |    |
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| ■ PCB contacts .....                   | 42 |

## Contacts



### Description

The UTL series is delivered without contacts (crimp version). This series offers the unique possibility to use the same contact in any layout as long as it receives the same active part size.

This provides the benefit of standardization and subsequent reduced inventory costs. In addition, it eliminates the need for added tooling and simplifies the assembly process. SOURIAU contacts are designed for simple snap-in installation and further eliminate the need for insertion tooling.

Crimp contacts are available in different versions:



• Machined



• Stamped & Formed



• Coaxial

The UTL series 3 + ground can be equipped with PCB contacts

## Contacts

## Contact plating selector guide

Once the contact size has been selected, the next step is to decide on which type to use. SOURIAU offers two main types of electrical contacts:

- Machined
- Stamped & Formed

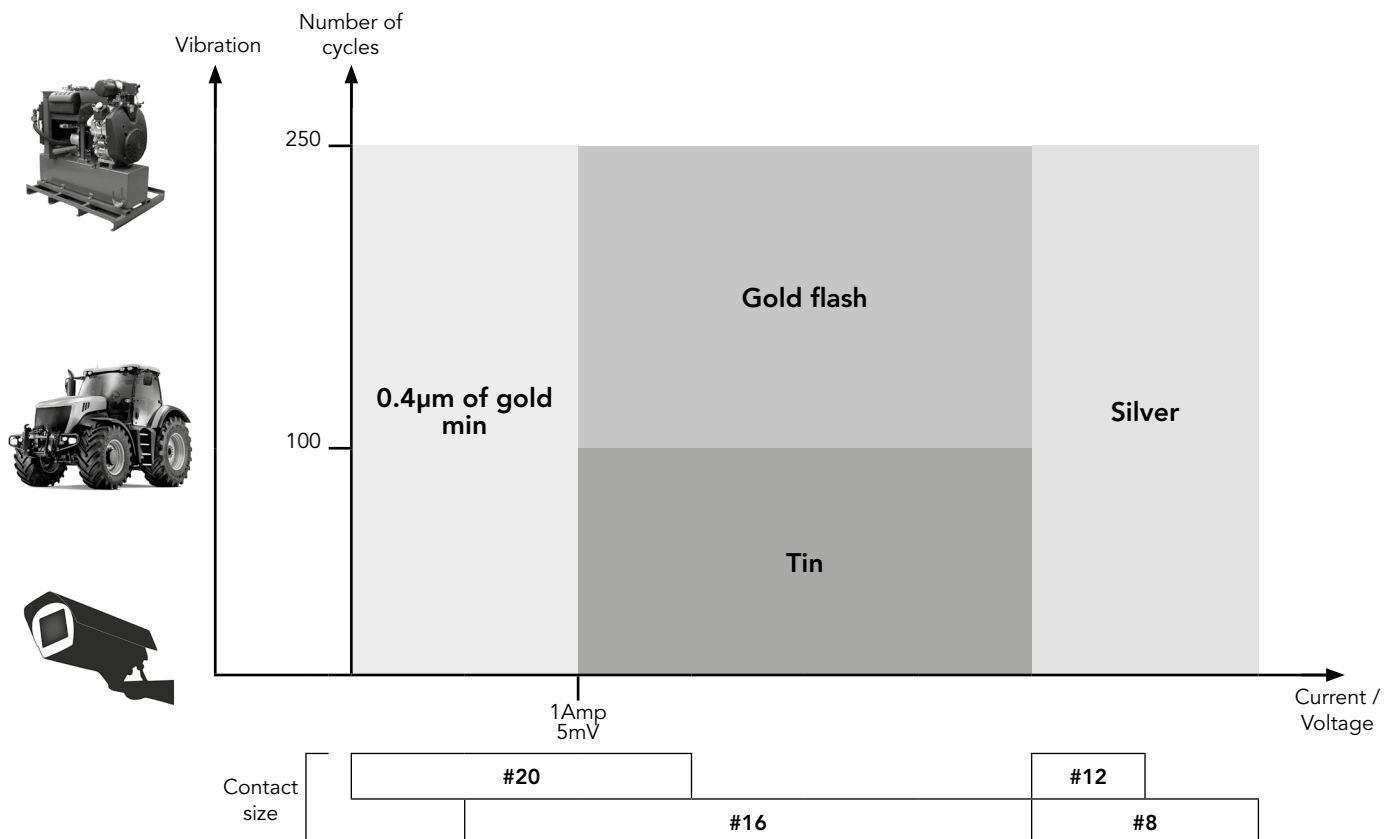
Machined contacts are generally chosen as a better solution for power applications or when lower quantities are needed.

Stamped & formed contacts offer the ability to be crimped automatically which makes them more suitable for high volume production applications.

The next decision to make is: What plating should I choose?

The graph below can help guide you to plating recommendations based on application, mating cycles and current/voltage needs.

Note: do not mix different plating (i.e. tin plated pin contacts with gold plated socket contacts).



## Contacts

### Plating selector guide

#### Contacts supplied separately

| Electrical characteristics: contact resistance |                    |       |
|------------------------------------------------|--------------------|-------|
| #20<br>Ø1mm                                    | Machined           | < 6mΩ |
|                                                | Stamped and Formed | < 6mΩ |
| #16<br>Ø1.6mm                                  | Machined           | < 3mΩ |
|                                                | Stamped and Formed | < 6mΩ |

#### Stamped & Formed contacts

| Contact size  | Plating code | Plating description          |                                                                         |
|---------------|--------------|------------------------------|-------------------------------------------------------------------------|
|               |              | Active area                  | Other areas                                                             |
| #20<br>Ø1mm   | S25 (female) | 0.75µm Gold mini over Nickel | Gold flash over Nickel                                                  |
|               | S26 (male)   | 0.75µm Gold mini over Nickel | Gold flash over Nickel                                                  |
|               | TK6          | 0.5µm - 2.5µm Sn pre-plated  | -                                                                       |
| #16<br>Ø1.6mm | S31          | Gold flash over Nickel       | Crimped area: 1.3µm Tin mini over Nickel<br>Other areas: 1.3µm Tin mini |
|               | S18          | 0.75µm Gold mini over Nickel |                                                                         |
|               | D70          | 0.13µm Gold mini over Nickel | Gold flash over Nickel                                                  |
|               | TK6          | 0.5µm - 2.5µm Sn pre-plated  | -                                                                       |

#### Machined contacts

| Contact size  | Plating code | Plating description                    |
|---------------|--------------|----------------------------------------|
|               |              | Active area                            |
| #20<br>Ø1mm   | K            | 0.4µm Gold over 2µm Nickel mini        |
| #16<br>Ø1.6mm | K            | 0.4µm Gold over 2µm Nickel mini        |
|               | J            | Gold flash over Nickel 2µm mini        |
|               | T            | Tin 3µm (-0/+2) over 1.3µm Nickel mini |
|               | D28*         | 0.75µm mini Gold over 2µm Nickel mini  |

\* For Coax contacts only

### Packaging - Size contacts #20 & #16

Due to the wide variety of applications, contact packaging is offered for small series (bulk package) and high volume production (reeled contacts):

#### Stamped & Formed



• 25 pieces loose package



• 3,000 pieces reeled

#### Machined contacts\*



• 50 pieces bulk package



• 1,000 pieces bulk package



• 2,000 pieces reeled

\* Note : 1,000 pieces bulk package available by adding 1000 at the end of the part number: e.g. RC16M23K1000  
2,000 pieces reeled package available by adding K at the beginning of the part number: e.g. KRC16M23K

## Crimp contacts

### Standard version



| Contact size   | Type                    | Wire size |           | Part number                     |                                 | Max wire Ø | Max insulator Ø    | Available plating<br>see page 38  |
|----------------|-------------------------|-----------|-----------|---------------------------------|---------------------------------|------------|--------------------|-----------------------------------|
|                |                         | AWG       | mm²       | Male                            | Female                          |            |                    |                                   |
| #20<br>Ø1 mm   | Machined                | 26-24     | 0.13-0.20 | RM24W3K                         | RC24W3K                         | 0.80       | 1.58 max           | K                                 |
|                | Stamped & Formed        | 26-24     | 0.13-0.25 | SM24W3 - (1)                    | SC24W3 - (1)                    | -          | 0.89-1.58          | TK6<br>S25 (female)<br>S26 (male) |
|                |                         |           |           | SM24WL3 - (2)                   | SC24WL3 - (2)                   | -          |                    |                                   |
|                | Machined                | 22-20     | 0.32-0.52 | RM20W3K                         | RC20W3K                         | 1.15       | 1.58 max           | K                                 |
|                | Stamped & Formed        | 22-20     | 0.35-0.5  | SM20W3 - (1)                    | SC20W3 - (1)                    | -          | 1.17-2.08          | TK6<br>S25 (female)<br>S26 (male) |
|                |                         |           |           | SM20WL3 - (2)                   | SC20WL3 - (2)                   | -          |                    |                                   |
| #16<br>Ø1.6 mm | Machined                | 20-18     | 0.50-0.93 | RM18W3K                         | RC18W3K                         | 1.30       | 2.10 max           | K                                 |
|                | Machined                | 30-28     | 0.05-0.08 | RM28M1-                         | RC28M1-                         | 0.55       | 1.1                | K, J                              |
|                | Machined                | 26-24     | 0.13-0.2  | RM24M9-                         | RC24M9-                         | 0.80       | 1.6                | K, J                              |
|                | Stamped & Formed        | 26-24     | 0.13-0.25 | SM24M1 - (1)<br>SM24ML1 - (2)   | SC24M1 - (1)<br>SC24ML1 - (2)   | 0.89-1.28  | 0.89-1.58          | TK6, S31, S18                     |
|                |                         |           |           |                                 |                                 |            |                    |                                   |
|                | Machined                | 22-20     | 0.32-0.52 | RM20M13-                        | RC20M13-                        | 1.15       | 1.8                | K, J                              |
|                |                         |           |           | RM20M12-                        | RC20M12-                        |            | 2.2                |                                   |
|                | Stamped & Formed        | 22-20     | 0.35-0.5  | SM20M1 - (1)<br>SM20ML1 - (2)   | SC20M1 - (1)<br>SC20ML1 - (2)   | 1.17-2.08  | 1.17-2.08          | TK6, S31, S18                     |
|                |                         |           |           |                                 |                                 |            |                    |                                   |
|                | Machined                | 20-16     | 0.52-1.5  | RM16M23-                        | RC16M23-                        | 1.80       | 3.2                | K, J                              |
|                | Machined Sealed contact | 20-16     | 0.52-1.5  | RM16M25K                        | RC16M25K                        | 1.80       | 3.2                | K                                 |
|                | Machined Sealed contact | 24        | 0.25      | RM24M25K <sup>(3)</sup>         | RM24M25K <sup>(3)</sup>         | 0.65       | 3.2                | K                                 |
|                | Stamped & Formed        | 18-16     | 0.8-1.5   | SM16M1 - (1)<br>SM16ML1 - (2)   | SC16M1 - (1)<br>SC16ML1 - (2)   | 3.00       | No insulation grip | TK6, S31, S18                     |
|                |                         |           |           |                                 |                                 |            |                    |                                   |
|                | Stamped & Formed        | 18-16     | 0.8-1.5   | SM16M11 - (1)<br>SM16ML11 - (2) | SC16M11 - (1)<br>SC16ML11 - (2) | 2.00-3.00  | 2.08-3             | TK6, S31, S18                     |
|                |                         |           |           |                                 |                                 |            |                    |                                   |
|                | Machined                | 16-14     | 1.5-2.5   | RM14M30-                        | RC14M30-                        | 2.30       | 3.2                | K, J                              |
|                | Stamped & Formed        | 14        | 2.0-2.5   | SM14M1 - (1)<br>SM14ML1 - (2)   | SC14M1 - (1)<br>SC14ML1 - (2)   | 3.20       | No insulation grip | TK6, S31, S18                     |
|                |                         |           |           |                                 |                                 |            |                    |                                   |
|                | Machined Sealed contact | 16-14     | 1.5-2.5   | RM14M25K                        | RC14M25K                        | 2.30       | 3.20               | K                                 |

(1): Contact reeled (2): Loose contact. Example: RM24W3K - Size #20, Machined, AWG24 wire.

(3): Includes RM/RC24M25K contacts + a ferrule RR24M1K. The ferrule can also be ordered separately. See page 53

### REMINDER

Plugs and receptacles have to be equipped with both contact genders. Examples:  
 UTL6122W3G1P = 2 x SM16M1TK6 (power) + 1 x SC16M1TK6 (ground) + 5 x SM20W3TK6 (signal)

Note: all dimensions are in mm and for information only

## Crimp contacts

### First Mate Last Break contacts

| Contact size                                                                                      | Type     | Wire size |           | Part number        |                    | Max wire Ø (mm) | Max insulator Ø (mm) | Color band |      | Available plating see p. 38 |
|---------------------------------------------------------------------------------------------------|----------|-----------|-----------|--------------------|--------------------|-----------------|----------------------|------------|------|-----------------------------|
|                                                                                                   |          | AWG       | mm²       | Male               | Female             |                 |                      | Front      | Rear |                             |
| <b>#16</b><br>Ø1.6 mm<br><br>Longer male contact (+1mm) for First Mate Last Break Connection      | Machined | 30-28     | 0.05-0.08 | <b>RM28M1GE1-</b>  | -                  | 0.55            | 1.0                  | -          | Red  | K                           |
|                                                                                                   |          | 26-24     | 0.13-0.2  | <b>RM24M9GE1-</b>  |                    | 0.8             | 1.6                  | Red        | Red  |                             |
|                                                                                                   |          | 22-20     | 0.32-0.52 | <b>RM20M12GE1-</b> |                    | 1.15            | 2.2                  | Blue       | Red  |                             |
|                                                                                                   |          | 20-16     | 0.52-1.5  | <b>RM16M23GE1-</b> |                    | 1.8             | 3.2                  | -          | Red  |                             |
|                                                                                                   |          | 16-14     | 1.5-2.5   | <b>RM14M30GE1-</b> |                    | 2.28            | -                    | -          | Red  |                             |
| <b>#16</b><br>Ø1.6 mm<br><br>Shorter female contact (-0.7mm) for Last Mate First Break Connection | Machined | 30-28     | 0.05-0.08 | -                  | <b>RC28M1GE7-</b>  | 0.55            | 1.0                  | -          | Blue | K                           |
|                                                                                                   |          | 26-24     | 0.13-0.2  |                    | <b>RC24M9GE7-</b>  | 0.8             | 1.6                  | Red        | Blue |                             |
|                                                                                                   |          | 22-20     | 0.32-0.52 |                    | <b>RC20M12GE7-</b> | 1.15            | 2.2                  | Blue       | Blue |                             |
|                                                                                                   |          | 18-16     | 0.92-1.5  |                    | <b>RC16M23GE7-</b> | 1.8             | 3.2                  | -          | Blue |                             |
|                                                                                                   |          | 16-14     | 1.5-2.5   |                    | <b>RC14M30GE7-</b> | 2.28            | -                    | -          | Blue |                             |

### How to make FMLB / LMFB\* connection

| Contact 1<br>Contact 2  | Standard male contact | Standard female contact | Longer male contact |
|-------------------------|-----------------------|-------------------------|---------------------|
| Standard male contact   |                       | ✓                       |                     |
| Standard female contact | ✓                     |                         | ✓<br>FMLB           |
| Shorter female contact  | ✓<br>LMFB             |                         |                     |

First Mate Last Break contacts should be chosen only if the cavity is not marked with the ground symbol. For cavities marked with the ground symbol, standard contacts will fulfill the same role as a first mate, last break contact used in a standard cavity.



Ground symbol

\* FMLB: First Mate Last Break / LMFB: Last Mate First Break

## #16 coaxial contacts

### Coaxial contact range

Note: Coax contacts cannot be used in the ground cavity

We provide 2 types of coaxial contacts suitable for 50 or 75Ω, coaxial cable or twisted pair cable.

#### Monocrimp coaxial contact

- The monocrimp one-piece coaxial contacts offer high reliability plus the economic advantage of a 95% reduction in installation time over conventional assembly methods.
- This economy is achieved by simultaneously crimping both the inner conductor and outer braid or drain wire.



#### Multipiece crimp coaxial contact

- The inner conductor and outer braid is crimped individually.
- The thermoplastic insulating bushing in the outer body is designed to accept and permanently retain the inner contact.
- An outer ferrule is used to connect the braid to the outer contact and provide cable support to ensure against bending and vibration.



#### Suitable for coaxial cable or twisted cable

- For jacket diameter from 1.78 to 3.05mm  
Inner conductor up to 2.44mm diameter



- For jacket diameter from 0.64 to 1.45mm  
Inner conductor from AWG30 to AWG24



#### Contacts for coaxial cable summary

| Contact type | Contact range |                |
|--------------|---------------|----------------|
|              | Male contact  | Female contact |
| Multipiece   | RMDXK10D28    | RCDXK1D28      |
| Monocrimp    | RMDX60xxD28   | RCDX60xxD28    |

#### Contacts for twisted pairs cable summary

| Contact type | Contact range           |                        |
|--------------|-------------------------|------------------------|
|              | Male contact            | Female contact         |
| Multipiece   | RMDXK10D28<br>+ YORX090 | RCDXK1D28<br>+ YORX090 |
| Monocrimp    | RMDX60xxD28             | RCDX60xxD28            |

PCB contacts for 3 + ground (103G1)

PCB contacts for 3 + ground (103G1)

PCB soldering

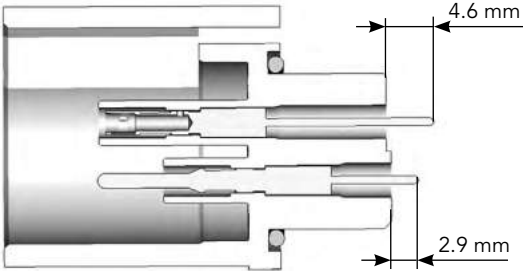
UTL range can be carried out with a wave soldering process, but not reflow soldering process.  
All high temperature processes are prohibited.

| Contact size  | Connector type | Part number contact |             | Plating<br>see page 38 |
|---------------|----------------|---------------------|-------------|------------------------|
|               |                | Male                | Female      |                        |
| #16<br>Ø1.6mm | Male insert    | RM20M12E8K          | RC20M12E84K | K                      |
|               | Female insert  | RM20M12E8K          | RC20M12E83K |                        |

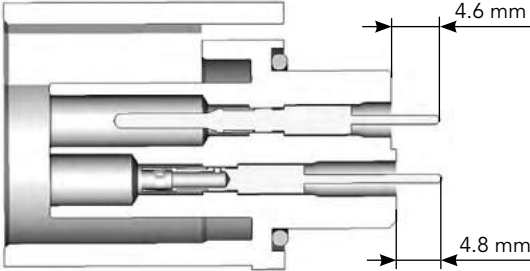
Nominal length

Dimension of dipsolder contacts out of connector (contacts to be ordered separately).

UTL7 female



UTL7 male



Note: The 6 pos. & 8 pos. layouts do not support PCB contacts

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SOURIAU

## Notes

# UTL SERIES

# Technical Information

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| ■ What is NEMA rating? .....                                 | 79 |
| ■ Ethernet for the Layman .....                              | 80 |
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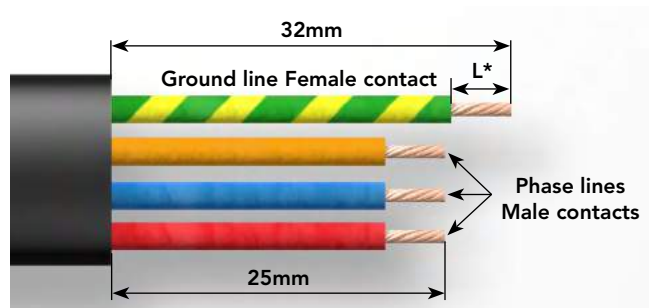
## Stripping instructions for crimp contacts

### Stripping & cutting dimensions of outer jacket

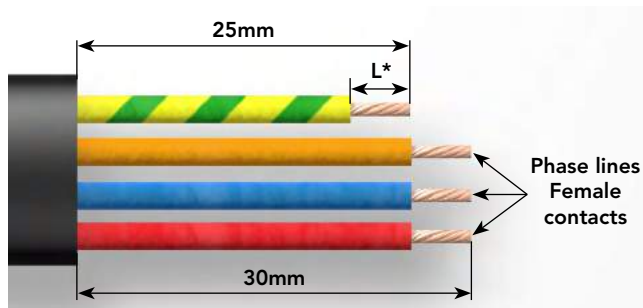
- Female insulator: Strip external cable sheath, adjust ground cable length
- Male insulator: Strip external cable sheath, adjust signal cable lengths
- Then, strip individual wire according to the recommended stripping length below
- Crimp contacts (see page 49)

#### 3 + ground

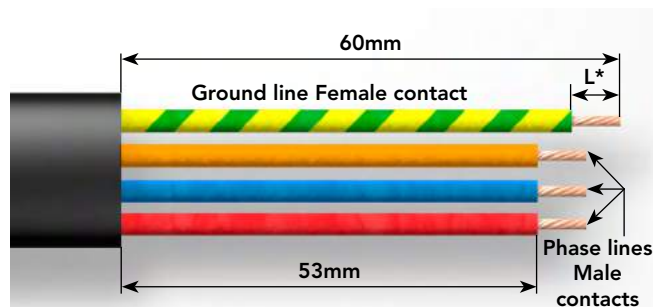
UTL0103G1P - UTL1103G1P - UTL5103G1P -  
UTL6103G1P - UTL6TH103G1P - UTL7103G1P



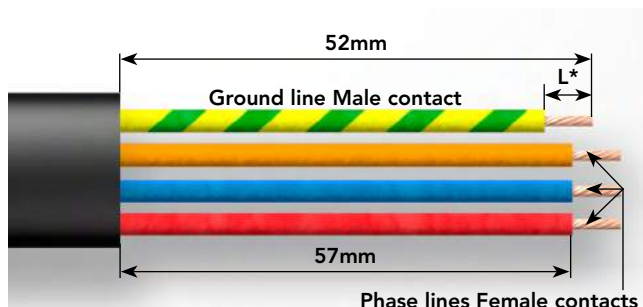
UTL0103G1S - UTL1103G1S - UTL5103G1S -  
UTL6103G1S - UTL6TH103G1S - UTL7103G1S



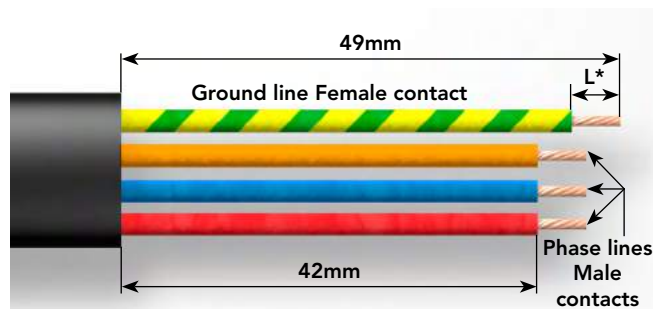
UTL6JC103G1P



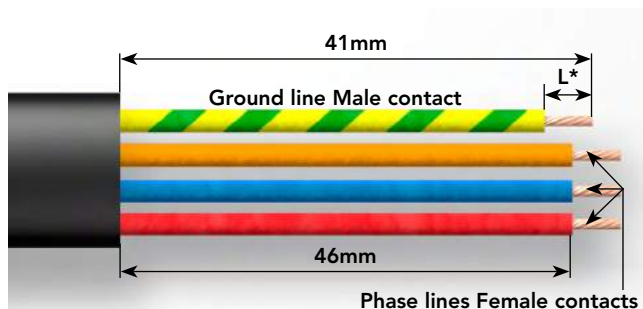
UTL6JC103G1S



UTL1JC103G1P



UTL1JC103G1S



\* see page 49

Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

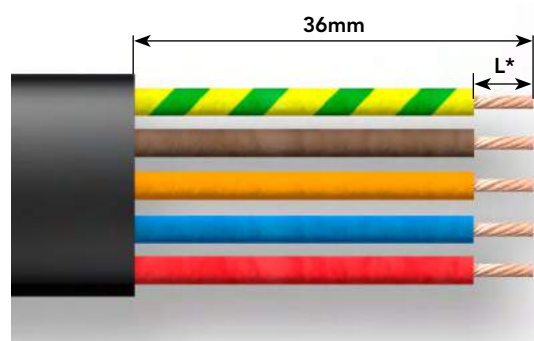
# Stripping instructions for crimp contacts

## Stripping & cutting dimensions of outer jacket

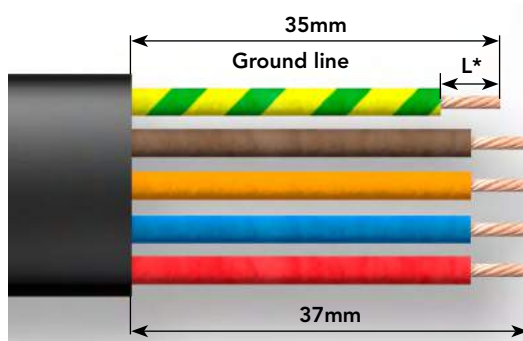
- Female insulator: Strip external cable sheath, adjust ground cable length
- Male insulator: Strip external cable sheath, adjust signal cable lengths
- Then, strip individual wire according to the recommended stripping length below
- Crimp contacts (see page 49)

### 5 pos.

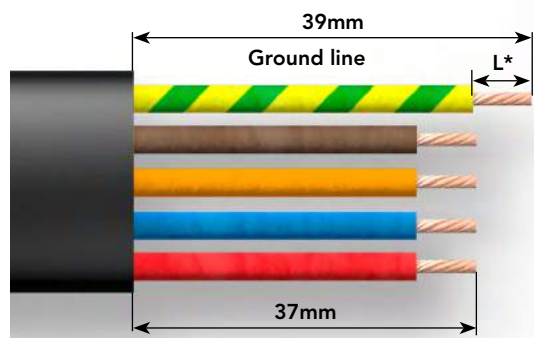
UTL6145P - UTL7145P - UTL1145P



UTL6145S - UTL7145S - UTL1145S

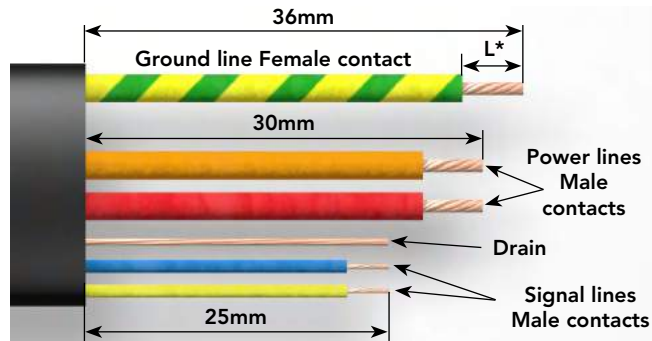


UTL6JC145SSCR

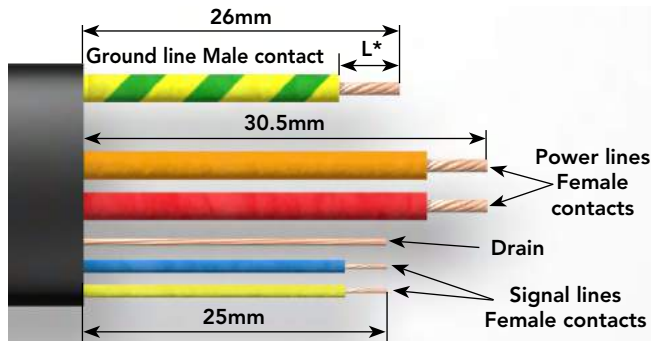


### 6 pos.

UTL6102G1W3P - UTL7102G1W3P - UTL1102G1W3P



UTL6102G1W3S - UTL7102G1W3S - UTL1102G1W3S



\* see page 49

Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

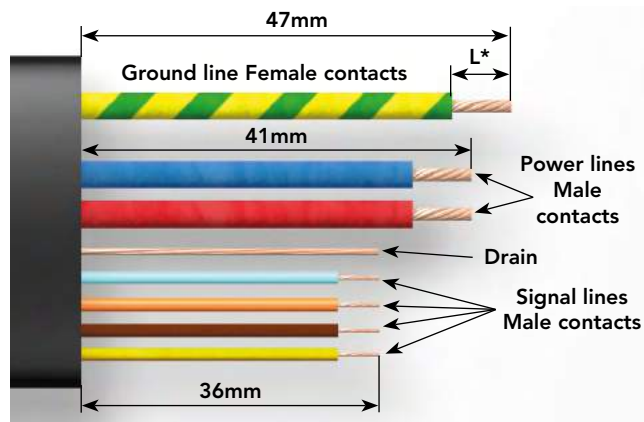
## Stripping instructions for crimp contacts

### Stripping & cutting dimensions of outer jacket

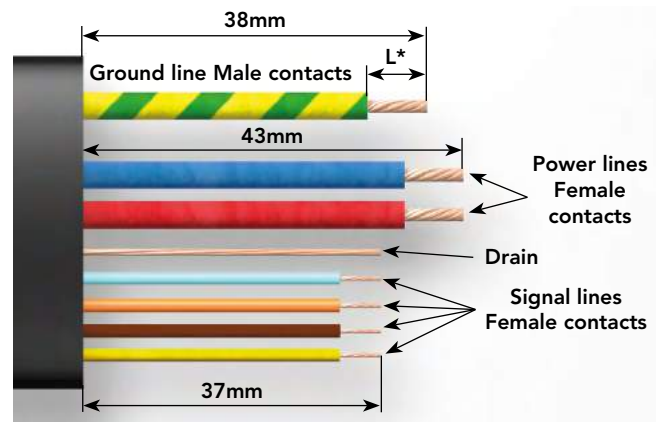
- Female insulator: Strip external cable sheath, adjust ground cable length
- Male insulator: Strip external cable sheath, adjust signal cable lengths
- Then, strip individual wire according to the recommended stripping length below
- Crimp contacts (see page 49)

**8 pos.**

UTL6122G1W5P - UTL7122G1W5P - UTL1122G1W5P



UTL6122G1W5S - UTL7122G1W5S - UTL1122G1W5S



\* see page 49

Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

# Stripping instructions for crimp contacts

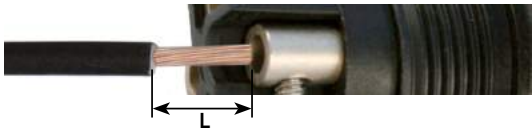
## Wire stripping length

|                                                                                                                                                    | Part number                             |                                         | Stripping length L (mm) |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------|-------------------------|
|                                                                                                                                                    | Male                                    | Female                                  |                         |
| <b>Machined contact</b><br>                                       | #20 - Ø 1mm                             |                                         |                         |
|                                                                                                                                                    | RM24W3- / RM20W3- / RM18W3-             | RC24W3- / RC20W3- / RC18W3-             | 4.8                     |
|                                                                                                                                                    | #16 - Ø 1.6mm                           |                                         |                         |
|                                                                                                                                                    | RM28M1- / RM24M9- / RM20M13- / RM20M12- | RC28M1- / RC24M9- / RC20M13- / RC20M12- | 4.8                     |
|                                                                                                                                                    | RM16M23- / RM14M30-                     | RC16M23- / RC14M30-                     | 7.1                     |
|                                                                                                                                                    | RM16M25- / RM14M25-                     | RC16M25- / RC14M25-                     | 5.4 / 5.2               |
| <b>Stamped &amp; formed</b><br><b>With insulation support</b><br> | #20 - Ø 1mm                             |                                         |                         |
|                                                                                                                                                    | SM24W3- / SM24WL3- / SM20W3- / SM20WL3- | SC24W3- / SC24WL3- / SC20W3- / SC20WL3- | 4                       |
|                                                                                                                                                    | #16 - Ø 1.6mm                           |                                         |                         |
|                                                                                                                                                    | SM24M1- / SM24ML1- / SM20M1- / SM20ML1- | SC24M1- / SC24ML1- / SC20M1- / SC20ML1- | 4                       |
|                                                                                                                                                    | SM16M11- / SM16ML11-                    | SC16M11- / SC16ML11-                    | 4.65                    |
|                                                                                                                                                    | #16 - Ø 1.6mm                           |                                         |                         |
| <b>Without insulation support</b><br>                           | #16 - Ø 1.6mm                           |                                         |                         |
|                                                                                                                                                    | SM16M1- / SM16ML1-                      | SC16M1- / SC16ML1-                      | 6.35                    |
|                                                                                                                                                    | SM14M1- / SM14ML1-                      | SC14M1- / SC14ML1-                      | 6.35                    |

Note: See page 38 for plating options and other contact details

Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

## Screw termination version

|                                                                                                                                      | Female        | Stripping length L (mm) |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------|
| <b>Screw contact delivered with connector</b><br> | #16 (Ø 1.6mm) |                         |
|                                                                                                                                      |               | 5.8                     |

Section: 1.5²mm or AWG16 max, 0.5²mm or AWG20 mini - Insulate diameter: Ø4mm maxi. - Cable diameter : Ø9mm to Ø17mm maxi

## Tooling for crimp contacts

### Automatic crimping tools



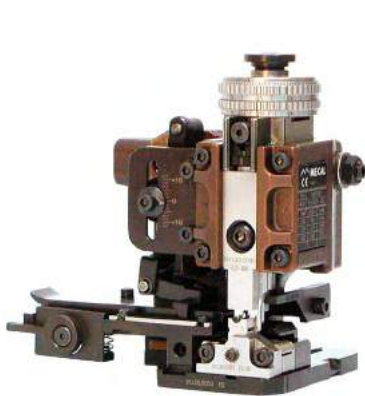
# SOURIAU

**Mecal is a leader in manufacturing tooling for crimping terminals over a stripped wire.**

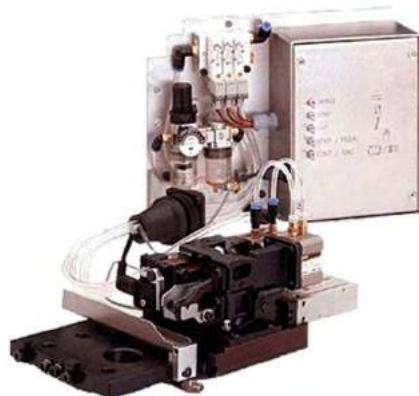
Established in 1976, Mecal has become one of the world's leading companies dedicated to the design and manufacture of semi automatic production tools for strip fed, open barrel crimp terminals, serving the Automotive, Telecom and Datacom industries.

SOURIAU designs, manufactures and markets **high performance - high reliability interconnect solutions** for severe environments dedicated to the Aerospace, Defense/Space, Heavy Industry (Railway & Mass Transit, Nuclear, Oil & Gas) and Industrial Equipment markets. SOURIAU has a worldwide presence with R & D centers and production sites in Europe, USA, Japan and India. The Company is deeply involved in the environmental protection with industrial sites following ISO 14001 and RoHS products.

SOURIAU has been working in partnership with Mecal for many years. With sales offices located in all major industrial regions of the world, the combined strengths of both organizations has resulted in a truly global solution to all your production tooling needs. If you need automatic crimping tool, don't hesitate to contact Mecal.



Mini Applicator



Stripper



Presses

Mecal sales network:

<http://www.mecal.net>

SOURIAU doesn't propose automatic crimp tooling. For tooling development, please contact directly Mecal or your tooling supplier.

## Tooling for crimp contacts

**Crimp tool table**

### Standard contacts

| Contact size                 | Part number               | Head*     | Handles* | Insertion tool | Extraction tools |
|------------------------------|---------------------------|-----------|----------|----------------|------------------|
| #20<br>Ø 1mm                 | RM/RC 24W3K               | S20RCM    | SHANGLES | -              | RX20D44          |
|                              | RM/RC 20W3K               |           |          |                |                  |
|                              | RM/RC 18W3K               |           |          |                |                  |
|                              | SM 24WL3S <sup>*(1)</sup> | S20SCM20  |          |                |                  |
|                              | SC 24WL3S <sup>*(1)</sup> |           |          |                |                  |
| SM/SC 20WL3S <sup>*(1)</sup> |                           |           |          |                |                  |
| #16<br>Ø 1.6mm               | RM/RC 28M1*               | S16RCM20  |          | RTM205         | RX2025GE1        |
|                              | RM/RC 24M9*               |           |          |                |                  |
|                              | RM/RC 20M13*              |           |          |                |                  |
|                              | RM/RC 20M12*              |           |          |                |                  |
|                              | RM/RC 16M23*              | S16RCM16  |          |                |                  |
|                              | RM/RC 14M30*              | S16RCM14  |          |                |                  |
|                              | SM/SC 24ML1*              | S16SCM20  |          |                |                  |
|                              | SM/SC 20ML1*              |           |          |                |                  |
|                              | SM/SC 16ML1*              | S16SCML1  |          |                |                  |
|                              | SM/SC 14ML1*              |           |          |                |                  |
|                              | SM/SC 16ML11*             | S16SCML11 |          |                |                  |

(1) loose contact

\* endurance of SHANGLES & Head tools = 50,000 cycles

### Specific contacts

| Contact size                            | Part number <sup>(1)</sup> | Hand tools*<br>(SHANDLES) head | Tool with separate locator |                              |      | Insertion<br>tool | Extraction<br>tool |       |         |     |
|-----------------------------------------|----------------------------|--------------------------------|----------------------------|------------------------------|------|-------------------|--------------------|-------|---------|-----|
|                                         |                            |                                | Hand tool                  | Positioner + locator setting |      |                   |                    |       |         |     |
| #16<br>1.6 mm<br>Sealed contact         | RM/RC 24M25K               | S16RCM1625                     | -                          | -                            | -    | RTM205            | RX2025GE1          |       |         |     |
|                                         | RM/RC 16M25K               | S16RCM1625                     | -                          | -                            | -    |                   |                    |       |         |     |
|                                         | RM/RC 14M25K               | S16RCM1425                     | -                          | -                            | -    |                   |                    |       |         |     |
| #16<br>Ø 1.6mm<br>Longer RM<br>contact  | RM28M1GE1K                 | S16RCM20                       | -                          | -                            | -    |                   |                    |       |         |     |
|                                         | RM24M9GE1K                 |                                |                            |                              |      |                   |                    |       |         |     |
|                                         | RM16M23GE1K                | S16RCM16                       |                            |                              |      |                   |                    | MH860 | MH86186 | 6/8 |
|                                         | RM14M30GE1K                | S16RCM14                       |                            |                              |      |                   |                    |       |         |     |
| #16<br>Ø 1.6mm<br>Shorter RC<br>contact | RC28M1GE7K                 | S16RCM20                       | MH860                      | MH86164G                     | 4/6  |                   |                    |       |         |     |
|                                         | RC24M9GE7K                 |                                |                            |                              | 5/6  |                   |                    |       |         |     |
|                                         | RC20M13GE7K<br>RC20M12GE7K |                                |                            |                              | 5/7  |                   |                    |       |         |     |
|                                         | RC16M23GE7K                |                                |                            |                              | 6/8  |                   |                    |       |         |     |
|                                         | RC14M30GE7K                | S16RCM14                       |                            | M317                         | UH25 |                   |                    | 3     |         |     |

(1) see page 38 for plating options and other contact details

\* endurance of SHANGLES & Head tools = 50,000 cycles

## Handle & interchangeable heads for crimp contacts

### Crimping with SOURIAU tooling

- 1) Fully close then release the tool, keep it open.  
Open the 2 pins.



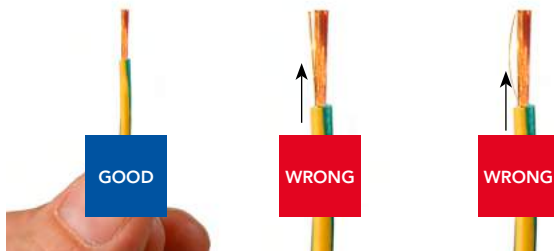
- 2) Choose the adapter head (sold separately), keep vertical and slide it into the handle until the mechanical stop.



- 3) Close the two pins simultaneously to maintain the head.



- 4) Strip the cable properly by checking the recommended size in the catalog on pages 46 to 48.



- 5) Place conductors, with no deterioration, in the contact bucket.  
All strands to be located in the crimp bucket.



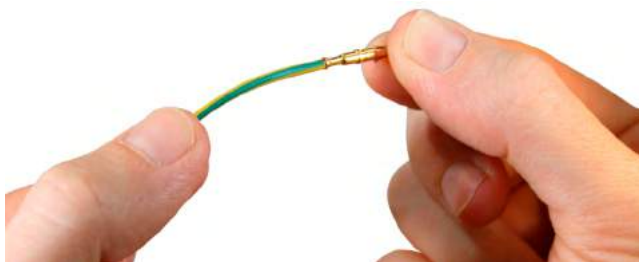
- 6) Position the contact in the bottom of the tool by checking its orientation. Maintain the wire in position.



- 7) Tighten sharply the handles to the end of the mechanism (max 175 N). After handles are opened, extract the contact.



- 8) Control the quality of crimping (see page 53).



Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

## Crimping control for crimp contacts

### Crimping

One of the key factors which affects the performance of a connector is the way contacts are terminated. Crimped connections are today seen as the best solution to ensure quality throughout the lifetime of the product. Here are some reasons why we recommend this method of termination for UTL connectors:

#### Advantages (Extract from the IEC 60352-2):

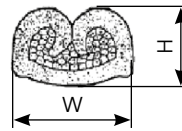
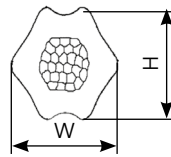
- Efficient processing of connections at each production level
- Processing by fully-automatic or semi-automatic crimping machines, or with hand operated tools
- No cold-soldered joints
- No degradation of the spring characteristic of female contacts by the soldering temperature

- No health risk from heavy metal and flux steam
- Preservation of conductor flexibility behind the crimped connection
- No burned, discolored and overheated wire insulation
- Good connections with reproducible electrical and mechanical performances
- Easy production control.

To ensure that the crimp tooling is performing according to original specifications, it is important to carry out regular checks. A common way to check the performance of tooling is with a simple pull test, ideally using a dedicated electric pull tester. Minimum recommended pull forces are indicated in the tables below:



Machined contact



Stamped & Formed contact



| Active contact part                 | Contact type                     | Die location on heads | Wire section range | Section (mm²) | Tensile straight test (mini) | Height (mm) H (±0.075) | Width (mm) W (±0.075) | Tooling head part number |
|-------------------------------------|----------------------------------|-----------------------|--------------------|---------------|------------------------------|------------------------|-----------------------|--------------------------|
| Machined contacts size #20 Ø 1 mm   | RM24W3K                          | 26/24                 | 26 AWG             | 0.12 min      | 15 N                         | 0.95                   | 1.27                  | S20RCM                   |
|                                     | RC24W3K                          |                       | 24 AWG             | 0.25 max      | 32 N                         |                        |                       |                          |
|                                     | RM20W3K                          | 22/20                 | 22 AWG             | 0.32 min      | 40 N                         | 1.26                   | 1.78                  |                          |
|                                     | RC20W3K                          |                       | 20 AWG             | 0.50 max      | 60 N                         |                        |                       |                          |
|                                     | RM18W3K                          | 20/18                 | 20 AWG             | 0.50 max      | 60 N                         | 1.35                   | 1.86                  |                          |
|                                     | RC18W3K                          |                       | 18 AWG             | 0.82 max      | 90 N                         |                        |                       |                          |
| S & F contacts size #20 Ø 1 mm      | SM24WL3TK6*                      | 26/24                 | 26 AWG             | 0.12 min      | 15 N                         | 0.80                   | 1.49                  | S20SCM20                 |
|                                     | SC24WL3TK6*                      |                       | 24 AWG             | 0.25 max      | 32 N                         |                        |                       |                          |
|                                     | SM20WL3TK6*                      | 22/20                 | 22 AWG             | 0.32 min      | 40 N                         | 1.01                   | 1.53                  |                          |
|                                     | SC20WL3TK6*                      |                       | 20 AWG             | 0.50 max      | 60 N                         |                        |                       |                          |
| Machined contacts size #16 Ø 1.6 mm | RM28M1K*                         | 30/28                 | 30 AWG             | 0.05 min      | 11 N                         | 1.14                   | 1.41                  | S16RCM20                 |
|                                     | RC28M1K*                         |                       | 28 AWG             | 0.08 max      | 11 N                         |                        |                       |                          |
|                                     | RM24M9K*                         | 26/24                 | 26 AWG             | 0.12 min      | 15 N                         | 1.15                   | 1.41                  |                          |
|                                     | RC24M9K*                         |                       | 24 AWG             | 0.25 max      | 32 N                         |                        |                       |                          |
|                                     | RM20M13K*                        | 22/20                 | 22 AWG             | 0.32 min      | 40 N                         | 1.26                   | 1.76                  |                          |
|                                     | RC20M13K*                        |                       | 20 AWG             | 0.50 max      | 60 N                         |                        |                       |                          |
|                                     | RM20M12K*                        |                       | 22 AWG             | 0.32 min      | 40 N                         |                        |                       |                          |
|                                     | RC20M12K*                        |                       | 20 AWG             | 0.50 max      | 60 N                         |                        |                       |                          |
|                                     | RM16M23K*                        | 20                    | 20 AWG             | 0.50 max      | 60 N                         | 1.66                   | 2.18                  | S16RCM16                 |
|                                     | RC16M23K*                        | 18                    | 18 AWG             | 0.82 max      | 90 N                         | 1.80                   | 2.28                  |                          |
|                                     |                                  | 16                    | 16 AWG             | 1.50 max      | 150 N                        | 1.96                   | 2.43                  |                          |
|                                     | RM24M25K                         | 20                    | 24 AWG             | 0.25max       | 32 N                         | 1.66                   | 2.18                  | 16RCM1625                |
|                                     | RM16M25K                         | 118                   | 18 AWG             | 0.82 max      | 90 N                         | 1.80                   | 2.28                  | S16RCM1625               |
|                                     | RC16M25K                         |                       | 16                 | 16 AWG        | 1.50 max                     | 150 N                  | 1.96                  |                          |
|                                     | RM14M25K                         | 16                    | 16 AWG             | 1.50 min      | 150 N                        | 2.10                   | 2.68                  | S16RCM1425               |
|                                     | RC14M25K                         | 14                    | 14 AWG             | 2.50 min      | 230 N                        | 2.30                   | 2.78                  |                          |
|                                     | RM14M30K*                        | 16                    | 16 AWG             | 1.50 min      | 150 N                        | 2.10                   | 2.68                  | S16RCM14                 |
|                                     | RC14M30K*                        | 14                    | 14 AWG             | 2.50 min      | 230 N                        | 2.30                   | 2.78                  |                          |
|                                     | S & F contacts size #16 Ø 1.6 mm | SM24ML1TK6*           | 26/24              | 26 AWG        | 0.12 min                     | 15 N                   | 0.84                  | 1.50                     |
| SC24ML1TK6*                         |                                  | 24 AWG                |                    | 0.25 max      | 32 N                         |                        |                       |                          |
| SM20ML1TK6*                         |                                  | 22/20                 | 22 AWG             | 0.32 min      | 40 N                         | 1.02                   | 1.54                  |                          |
| SC20ML1TK6*                         |                                  |                       | 20 AWG             | 0.50 max      | 60 N                         |                        |                       |                          |
| SM16ML11TK6*                        |                                  | 18                    | 18 AWG             | 0.82 min      | 90 N                         | 1.32                   | 2.09                  | S16SCML11                |
| SC16ML11TK6*                        |                                  | 16                    | 16 AWG             | 1.50 max      | 150 N                        | 1.36                   | 2.10                  |                          |
| SM16ML1TK6*                         |                                  | 18                    | 18 AWG             | 0.82 min      | 90 N                         | 1.49                   | 2.02                  | S16SCML1                 |
| SC16ML1TK6*                         |                                  | 16                    | 16 AWG             | 1.50 max      | 150 N                        | 1.7                    | 2.05                  |                          |
| SM14ML1TK6*                         |                                  | 14                    | 14 AWG             | 2.50 max      | 230 N                        | 1.79                   | 2.58                  |                          |
| SC14ML1TK6*                         |                                  |                       |                    |               |                              |                        |                       |                          |

\* example of plating, for other plating see page 38

Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

## Insertion tool for crimp contacts

| Contact size | Part number |
|--------------|-------------|
| #16          | RTM205      |



RTM205

## Extraction tool for crimp contacts

| Contact size | Part number |
|--------------|-------------|
| #20          | RX20D44     |
| #16          | RX2025GE1   |



RX20D44



RX2025GE1

## Contact extraction instructions

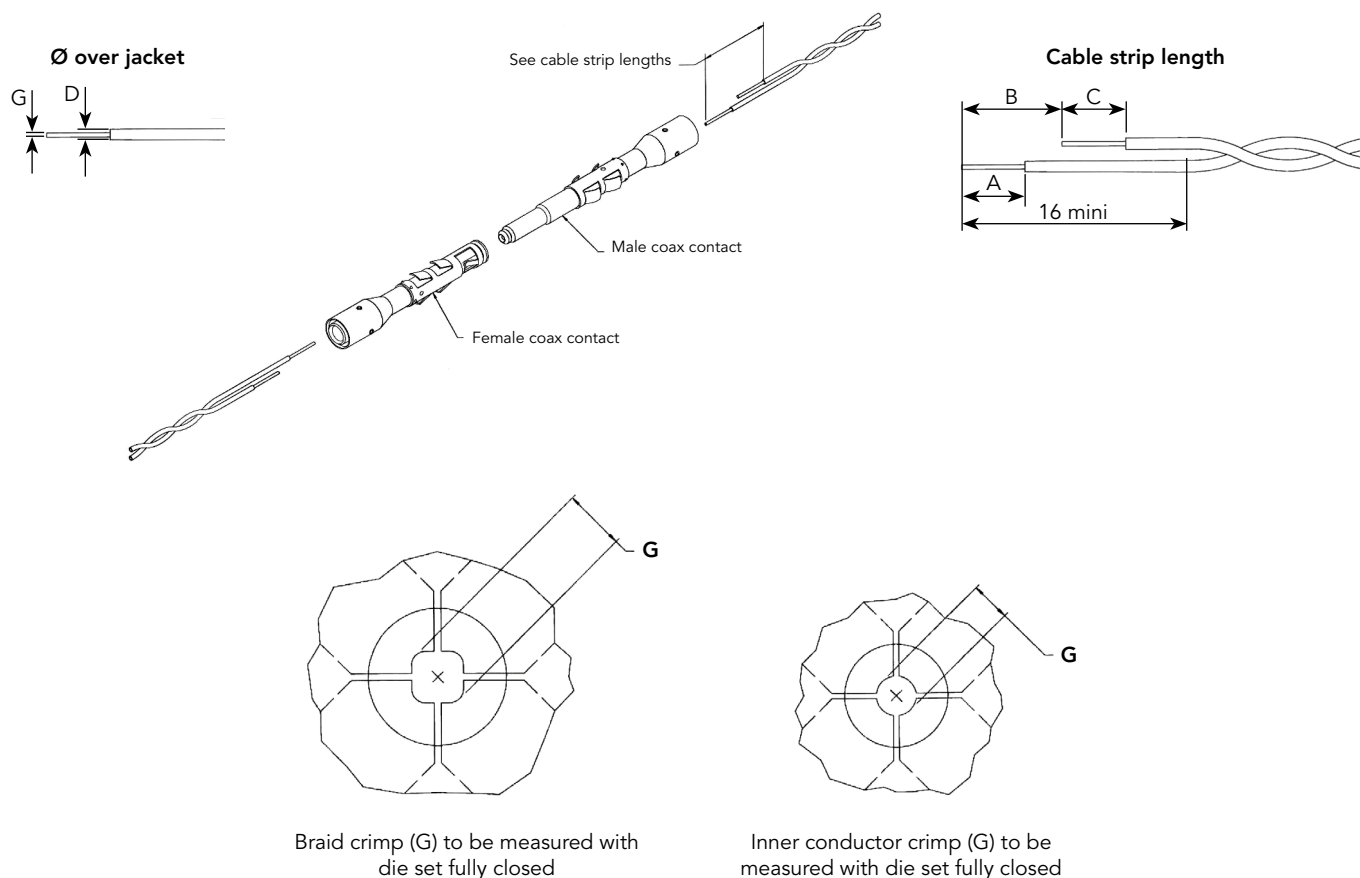
Place the tool into the cavity from front face of the connector, push on the handle, then remove the contact.  
#20 female contact are not removable.



## #16 coaxial contacts

### Twisted pair cable monocrimp contact cabling

| Cable type        | Ø over jacket (mm) |                     | Part number |             | Crimp tool | Inner + outer tool | Cable strip length (mm) |     |     |
|-------------------|--------------------|---------------------|-------------|-------------|------------|--------------------|-------------------------|-----|-----|
|                   | Outer maxi Ø D     | Inner conductor Ø G |             |             |            |                    | A                       | B   | C   |
| AWG26<br>(7x0.16) | 1.05               | 0.48                | Male        | RMDX6031D28 | M20S-1J    | S-80J +<br>SL-105J | 4.7                     | 6.0 | 4.0 |
|                   |                    |                     | Female      | RCDX6031D28 |            |                    |                         |     |     |



## Tooling for coaxial contacts

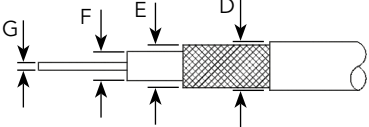
M20S-1J


Die and  
Stop Bushing

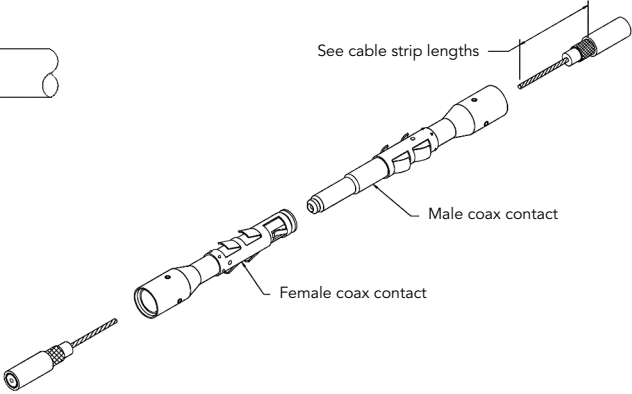
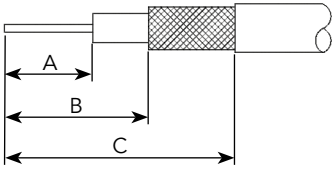
#16 coaxial contacts

| Coax cable with monocrimp contact cabling |                    |                |                 |                |                     |             |             |            |                    |                         |      |       |
|-------------------------------------------|--------------------|----------------|-----------------|----------------|---------------------|-------------|-------------|------------|--------------------|-------------------------|------|-------|
| Cable type                                | Ø over jacket (mm) |                |                 |                |                     | Part number |             | Crimp tool | Inner + outer tool | Cable strip length (mm) |      |       |
|                                           | Impedance Ohm      | Outer maxi Ø D | Outer braid Ø E | Dielectric Ø F | Inner conductor Ø D |             |             |            |                    | A                       | B    | C     |
| RG174/U                                   | 50                 | 2.92           | 2.24            | 1.52           | 0.48                | Male        | RMDX6032D28 | M20S-1J    | S-80J + SL-105J    | 5.08                    | 6.35 | 11.68 |
|                                           |                    |                |                 |                |                     | Female      | RCDX6032D28 |            |                    |                         |      |       |
| RG188A/U                                  | 50                 | 2.79           | 1.98            | 1.52           | 0.51                | Male        | RMDX6036D28 | M20S-1J    | S-80J + SL-105J    | 5.08                    | 6.35 | 11.68 |
|                                           |                    |                |                 |                |                     | Female      | RCDX6036D28 |            |                    |                         |      |       |
| RG316/U                                   | 50                 | 2.49           | 2.05            | 1.52           | 0.51                | Male        | RMDX6036D28 | M20S-1J    | S-80J + SL-105J    | 5.08                    | 6.35 | 11.68 |
|                                           |                    |                |                 |                |                     | Female      | RCDX6036D28 |            |                    |                         |      |       |

Ø over jacket



Cable strip length



See cable strip lengths

Tooling for coaxial contacts



## #16 coaxial contacts

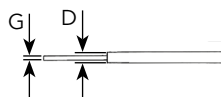
### Twisted pair cable multipiece contact cabling

| Cable type        | Ø over jacket (mm) |                     | Part number |                      | Crimp tool | Inner tool             | Outer tool             | Cable strip length (mm) |      |      |
|-------------------|--------------------|---------------------|-------------|----------------------|------------|------------------------|------------------------|-------------------------|------|------|
|                   | Outer maxi Ø D     | Inner conductor Ø G |             |                      |            |                        |                        | A                       | B    | C    |
| AWG26<br>(7x0.16) | 1.05               | 0.48                | Male        | RMDXK10D28 + YORX090 | M20S-1J    | S26D2J<br>+<br>SL46D2K | S22-1J<br>+<br>SL47-1J | 7.95                    | 7.95 | 7.95 |
|                   |                    |                     | Female      | RCDXK10D28 + YORX090 |            |                        |                        | 6.35                    | 6.35 | 7.95 |

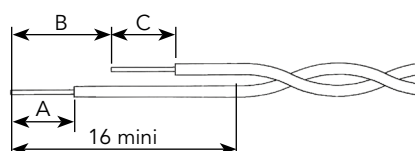
#### Multipiece kit details

|                                                      |                         |
|------------------------------------------------------|-------------------------|
| <b>RMDXK10D28<br/>or<br/>RCDXK10D28<br/>includes</b> | Outer contact           |
|                                                      | Inner contact           |
|                                                      | Outer hyring            |
|                                                      | Inner supporting sleeve |

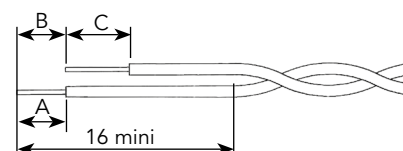
#### Ø over jacket



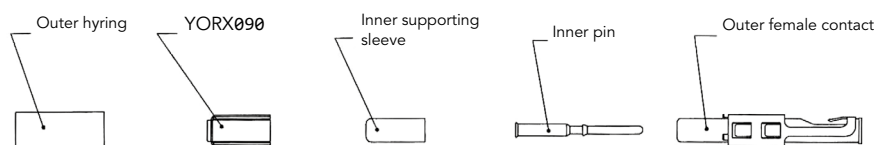
#### Male cable strip length



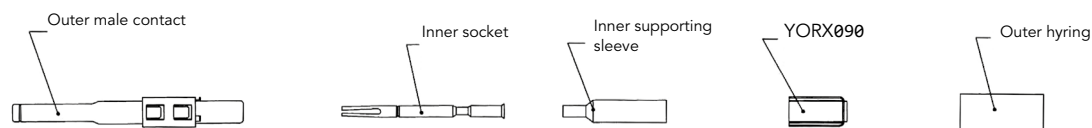
#### Female cable strip length



#### Female contact



#### Male contact



## Tooling for coaxial contacts

M20S-1J


Die and  
Stop Bushing

## #16 coaxial contacts

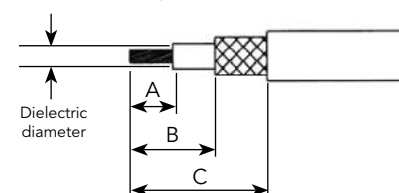
### Twisted pair cable multipiece male contact cabling

| Cable type | Ø over jacket (mm) |                |                 |                |                     | Part number | Crimp tool                | Inner tool             | Outer tool             | Cable strip length (mm) |      |       |
|------------|--------------------|----------------|-----------------|----------------|---------------------|-------------|---------------------------|------------------------|------------------------|-------------------------|------|-------|
|            | Impedance Ohm      | Outer maxi Ø D | Outer braid Ø E | Dielectric Ø F | Inner conductor Ø D |             |                           |                        |                        | A                       | B    | C     |
| RG174/U    | 50                 | 2.92           | 2.24            | 1.52           | 0.48                | RMDXK10D28  | M20S-1J<br>see<br>page 57 | S26D2J<br>+<br>SL46D2K | S22-1J<br>+<br>SL47-1J | 4.37                    | 7.95 | 15.88 |
| RG188/U    | 50                 | 2.79           | 1.98            | 1.52           | 0.51                |             |                           |                        |                        |                         |      |       |
| RG161/U    | 70                 | 2.10           | -               | 1.45           | 0.30                |             |                           |                        |                        |                         |      |       |
| RG179A/U   | 75                 | 2.67           | 2.13            | 1.60           | 0.30                |             |                           |                        |                        |                         |      |       |
| RG179B/U   | 75                 | 2.67           | 2.13            | 1.60           | 0.30                |             |                           |                        |                        |                         |      |       |
| RG187/U    | 75                 | 2.79           | 1.98            | 1.52           | 0.30                |             |                           |                        |                        |                         |      |       |
| RG178A/U   | 50                 | 1.91           | 1.37            | 0.86           | 0.30                |             |                           |                        |                        | 7.54                    | 9.12 | 17.53 |
| RG196/U    | 50                 | 2.03           | -               | 0.86           | 0.30                |             |                           |                        |                        |                         |      |       |

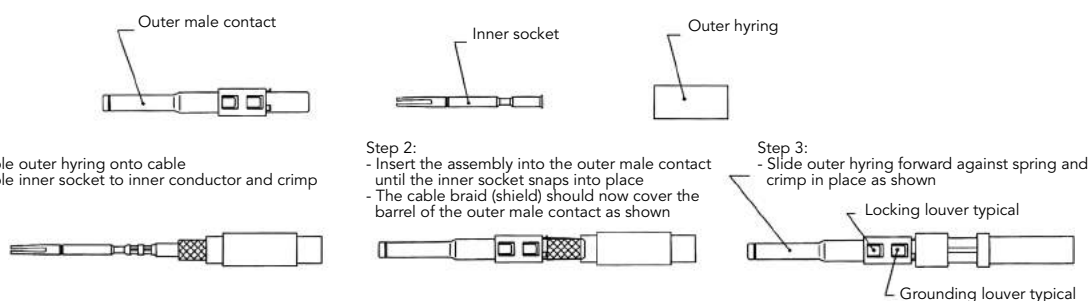
#### Multipiece kit details

|                        |                         |
|------------------------|-------------------------|
| RMDXK10D28<br>includes | Outer contact           |
|                        | Inner contact           |
|                        | Outer hyring            |
|                        | Inner supporting sleeve |

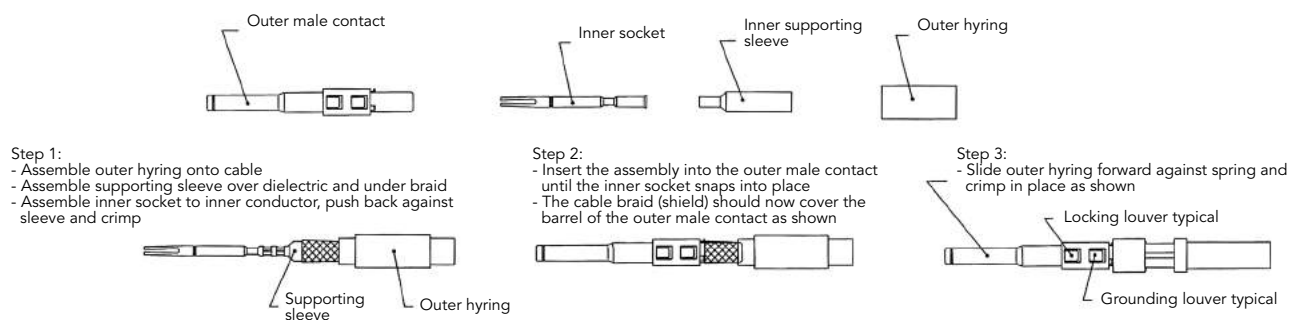
#### Cable strip length



#### Contact assembly with dielectric diameter over 1.4mm - without inner supporting sleeve



#### Contact assembly with dielectric diameter under 1.4mm - with inner supporting sleeve



# #16 coaxial contacts

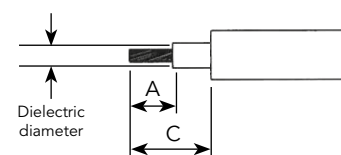
## Twisted pair cable multipiece female contact cabling

| Cable type | Ø over jacket (mm) |                |                 |                |                     | Part number | Crimp tool                | Inner tool          | Outer tool             | Cable strip length (mm) |       |
|------------|--------------------|----------------|-----------------|----------------|---------------------|-------------|---------------------------|---------------------|------------------------|-------------------------|-------|
|            | Impedance Ohm      | Outer maxi Ø D | Outer braid Ø E | Dielectric Ø F | Inner conductor Ø D |             |                           |                     |                        | A                       | C     |
| RG174/U    | 50                 | 2.92           | 2.24            | 1.52           | 0.48                | RCDXK1D28   | M20S-1J<br>see<br>page 57 | S26D2J +<br>SL46D2K | S22-1J<br>+<br>SL47-1J | 4.37                    | 11.13 |
| RG188/U    | 50                 | 2.79           | 1.98            | 1.52           | 0.51                |             |                           |                     |                        |                         |       |
| RG161/U    | 70                 | 2.10           | -               | 1.45           | 0.30                |             |                           |                     |                        |                         |       |
| RG179A/U   | 75                 | 2.67           | 2.13            | 1.60           | 0.30                |             |                           |                     |                        |                         |       |
| RG179B/U   | 75                 | 2.67           | 2.13            | 1.60           | 0.30                |             |                           |                     |                        |                         |       |
| RG187/U    | 75                 | 2.79           | 1.98            | 1.52           | 0.30                |             |                           |                     |                        |                         |       |
| RG178A/U   | 50                 | 1.91           | 1.37            | 0.86           | 0.30                |             |                           |                     |                        | 6.35                    | 11.13 |
| RG196/U    | 50                 | 2.03           | -               | 0.86           | 0.30                |             |                           |                     |                        |                         |       |

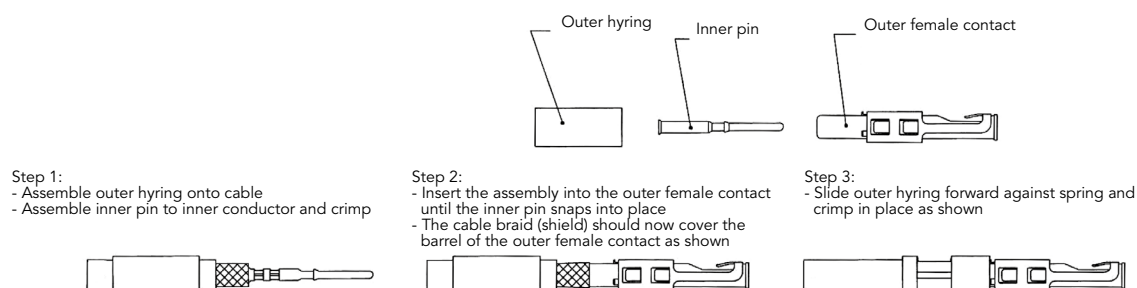
### Multipiece kit details

|                       |                         |
|-----------------------|-------------------------|
| RCDXK1D28<br>includes | Outer contact           |
|                       | Inner contact           |
|                       | Outer hyring            |
|                       | Inner supporting sleeve |

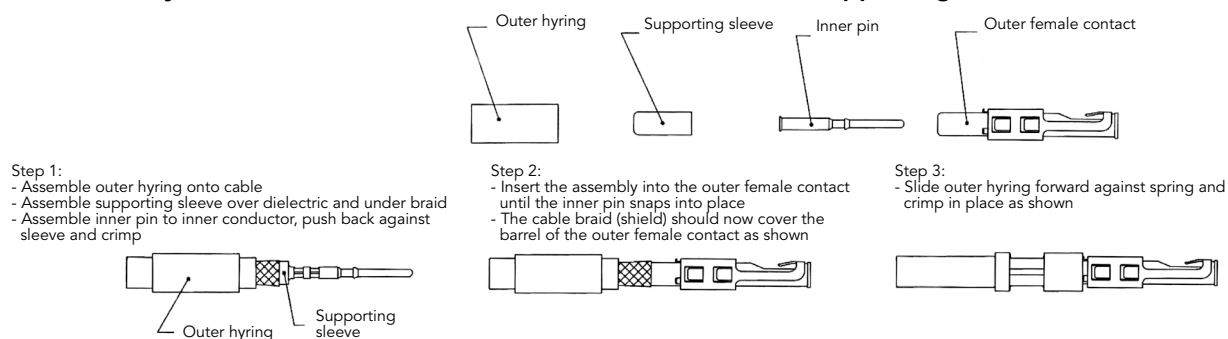
### Cable strip length



### Contact assembly with dielectric diameter over 1.4mm - without inner supporting sleeve



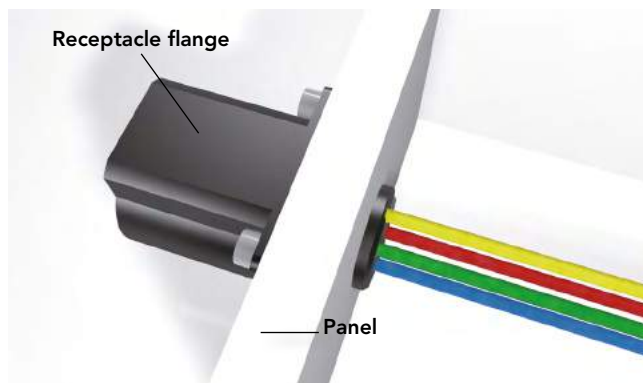
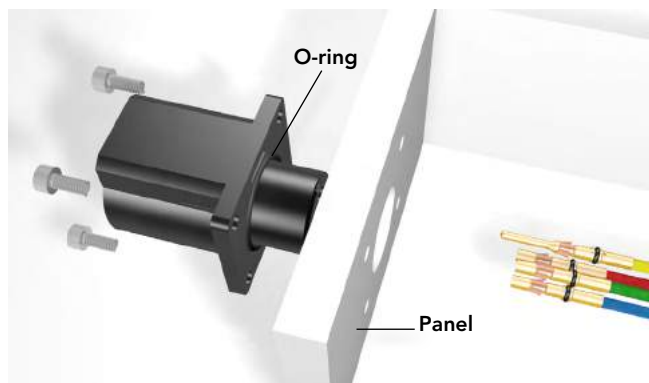
### Contact assembly with dielectric diameter under 1.4mm - with inner supporting sleeve



## Assembly instructions

### UTL0 assembly (Mounting suggestion)

- Strip wires
- Crimp contacts
- Place all the contacts inside the corresponding cavities
- Manually push each contact, or use our tool (**RTM205** for #16 contacts), until audible click. Check each contact retention, with two finger retraction
- Place receptacle in the panel cut-out (see dimension page 19 for UTL103G1)
- Secure receptacle with M3 screws (not supplied), torque 0.7 Nm maxi



### UTL6 or UTL1 assembly

- Strip wires
- Crimp contacts
- Place all the contacts inside the corresponding cavities
- Manually push each contact, or use our tool (**RTM205** for #16 contacts), until audible click. Check each contact retention, with two finger retraction
- Do an overmoulding on the wired set or use heat shrink boot



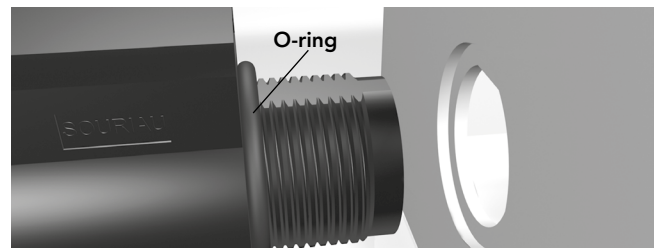
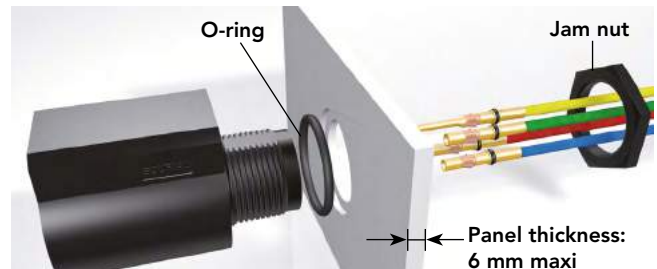
Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

## Assembly instructions

### UTL7 assembly (Mounting suggestion)

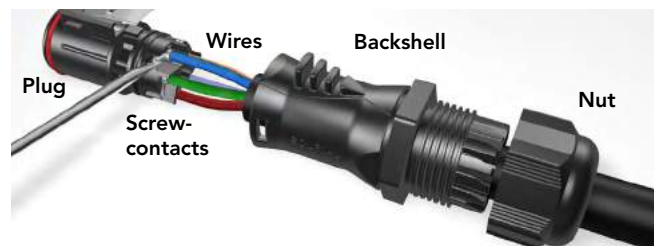
- Slide nut over the wires
- Strip wires
- Crimp contacts
- Place all the contacts inside the corresponding cavities
- Manually push each contact, or use our tool (**RTM205** for #16 contacts), until audible click. Check each contact retention, with two finger retraction
- Seat o-ring, place receptacle in the panel cut-out (see dimension page 19 for UTL103G1, page 23 for UTL145, page 27 for UTL102G1W3 or page 31 for UTL122G1W5)
- Tighten jam nut torque: 2.5 Nm maxi, tightening tool: 7/8"

Final view



### UTL6145 with backshell assembly

- Slide backshell on the cable
- Strip wires
- For screw termination version: place each stripped wire in the contact and tighten the screw, advised torque 20 Ncm
- For crimp termination version: crimp contacts on wires and insert contacts in the cavities
- Check wire retention by a slight two finger retraction
- Then click the backshell on the plug rear side
- Tighten the cable gland on the backshell, indicative torque: 3 Nm
- Finally tighten the nut on the cable gland, wrench size 30, indicative torque: 8 Nm maxi (coupling torque will depend of the cable type)

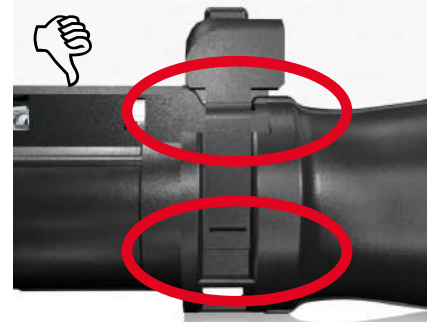


Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

## Assembly instructions

### Protective shroud assembly UTL6JC & UTL6TH (Mounting suggestion)

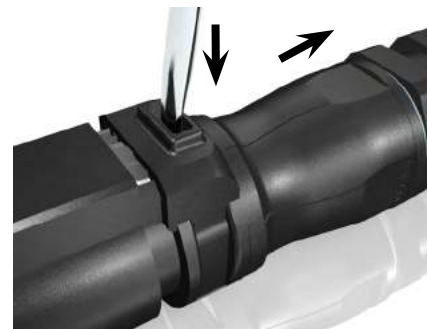
- No tool is required to assemble the Protective Shroud UTL10PS on the plug.
- Take care about the orientation of the protective shroud
- Put the protective shroud on the appropriate area until a click is heard
- By a visual control, make sure that the Protective Shroud is well oriented and inserted
- Please note that we don't recommend to dismantling the protective shroud after assembly



- The aim of the Protective Shroud is to not be able to disconnect the plug without a tool

- To disconnect the plug, when Protective Shroud is used, please use a screw driver and put the screw driver into the hole of the protective shroud

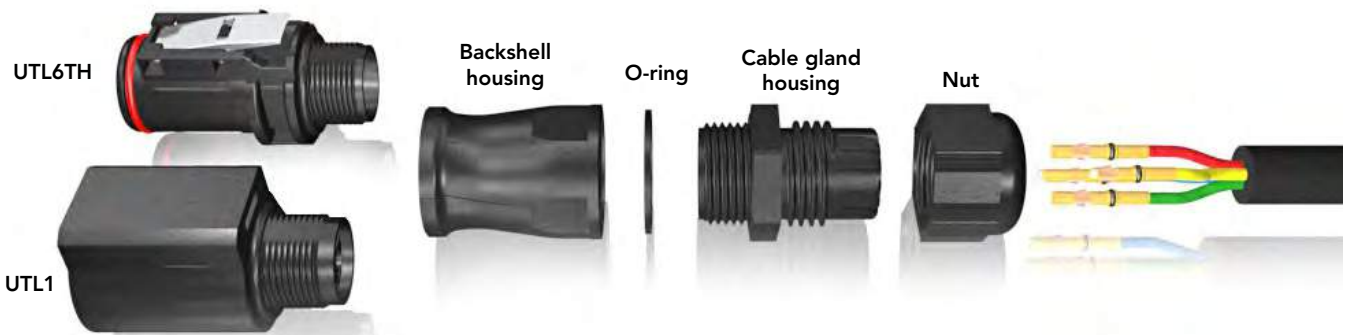
- Then push on the screwdriver and pull slightly on the plug do disconnect it



Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

# Assembly instructions

## UTL1JC103G1 & UTL6JC103G1 assembly (Mounting suggestion)



- Slide nut over the wires **1**
- Strip wires
- Crimp contacts
- Place all the contacts inside the corresponding cavities
- Manually push each contact, or use our tool (**RTM205** for #16 contacts), until audible click. Check each contact retention, with two finger retraction **2**
- Check the presence and the appropriate positioning of the connector O-ring
- Screw backshell housing at the rear of the connector until the mechanical stop (recommended coupling torque 2.5 Nm). You can use a dummy receptacle in order to facilitate this assembly operation **3**
- Then check the presence and the appropriate positioning of the cable gland gasket
- Screw the cable gland housing at the rear of the backshell housing by using a wrench (size 25) with the recommended coupling torque 3 Nm **4**

- Screw the nut of the cable gland by using a wrench (size 25). Recommended coupling torque 5 Nm **5**
- Please note that the coupling torque of the nut is for information only and may need to be adjusted according to your cable specification (diameter, flexibility, outer jacket material for example). SOURIAU cannot be responsible in case the coupling torque is not adapted to the cable specification



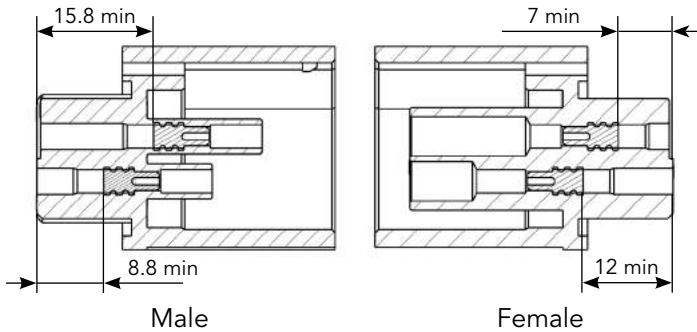
Note: Assembly operations mentioned above shall not interfere or to be in contradiction with the IPC-WHMA-A-620B

## Assembly instructions

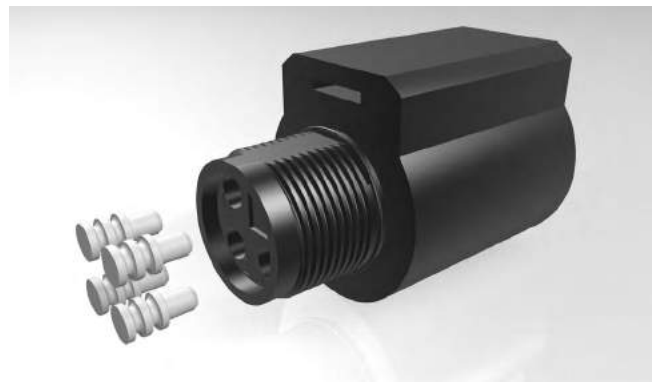
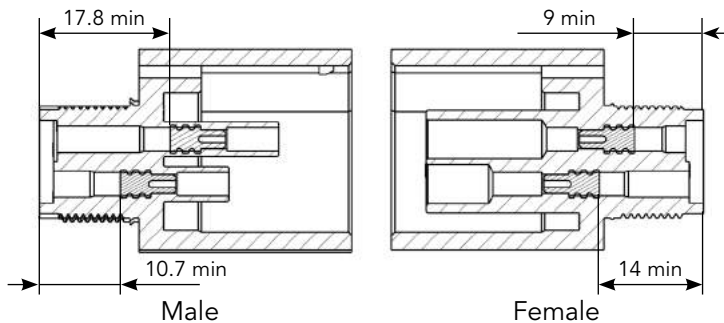
### SWSFILLERPLUG mounting for 3 + ground

Push the sealing plug into each connector cavity to seal until a mechanical stop.

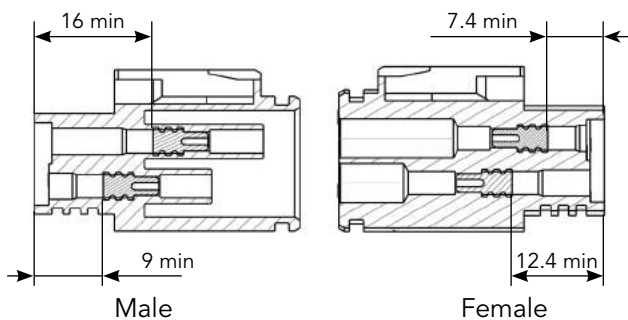
#### UTL0



#### UTL7 & UTL1



#### UTL6



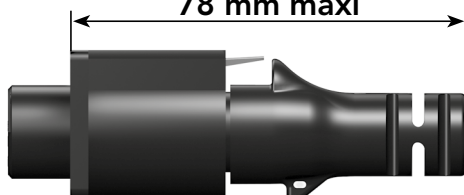
Note: all dimensions are in mm

## Mated connector length

**103G1** (shell size 10, 3 + ground, 4x#16) & **102G1W3** (shell size 10, 3x#16 + 3x#20)

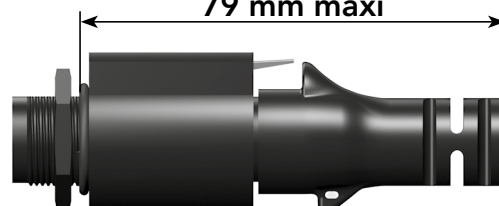
**UTL0 + UTL6 overmoulded**

78 mm maxi



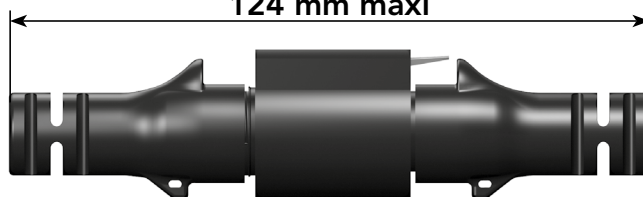
**UTL7 + UTL6 overmoulded**

79 mm maxi



**UTL1 + UTL6 overmoulded**

124 mm maxi



**UTL5 + UTL1JC**

102 mm maxi



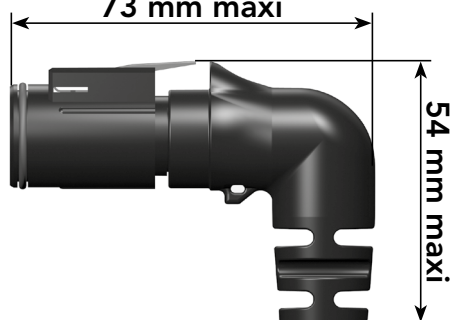
**UTL7 + UTL6JC**

102 mm maxi



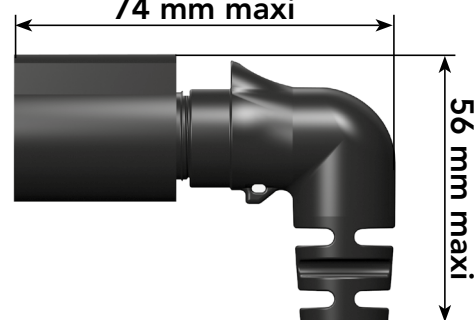
**Right angle overmoulded  
plug**

73 mm maxi



**Right angle overmoulded  
receptacle**

74 mm maxi



Note: all dimensions are in mm

## Mated connector length

### 122G1W5 (shell size 12, 3x#16 + 5x#20)

UTL7 + UTL6 overmoulded

91 mm maxi



UTL1 overmoulded + UTL6 overmoulded

135 mm maxi



### 145 (shell size 14, 5x#16)

UTL1 or UTL7 + UTL6

52



UTL1 or UTL7 + UTL6JC

105



Note: all dimensions are in mm

## Evaluation kit 3 contacts + ground part number (103G1)

Evaluation kit is composed of 1 connector, contacts and 1 heat shrink boot for a quick and easy assembly production.

Evaluation kit is the solution for a quick prototyping, please note that the IP level of the evaluation kit is IP67.

| Part number     | Connector type           | Gender       | Wire section |     | UTL6103G1P20AWG | UTL6103G1P16AWG | UTL1103G1P20AWG | UTL1103G1P16AWG | UTL7103G1P20AWG | UTL7103G1P16AWG | UTL0103G1P20AWG | UTL0103G1P16AWG | SM20M16W31S20AWG | SC20M16W31S20AWG | SM16M16W31S16AWG | SC16M16W31S16AWG | SM14M16W31S14AWG | SC14M16W31S14AWG |
|-----------------|--------------------------|--------------|--------------|-----|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|
|                 |                          |              | AWG          | mm² |                 |                 |                 |                 |                 |                 |                 |                 |                  |                  |                  |                  |                  |                  |
| UTL6103G1P20AWG | Plug                     | Male power   | 20           | 0.5 | 1               | -               | -               | -               | -               | -               | -               | -               | 4                | 2                | -                | -                | -                | -                |
| UTL6103G1P16AWG | Plug                     | Male power   | 16           | 1.5 | 1               | -               | -               | -               | -               | -               | -               | -               | -                | -                | 4                | 2                | -                | -                |
| UTL6103G1P14AWG | Plug                     | Male power   | 14           | 2.5 | 1               | -               | -               | -               | -               | -               | -               | -               | -                | -                | -                | -                | 4                | 2                |
| UTL6103G1S20AWG | Plug                     | Female power | 20           | 0.5 | -               | 1               | -               | -               | -               | -               | -               | -               | 2                | 4                | -                | -                | -                | -                |
| UTL6103G1S16AWG | Plug                     | Female power | 16           | 1.5 | -               | 1               | -               | -               | -               | -               | -               | -               | -                | -                | 2                | 4                | -                | -                |
| UTL6103G1S14AWG | Plug                     | Female power | 14           | 2.5 | -               | 1               | -               | -               | -               | -               | -               | -               | -                | -                | -                | -                | 2                | 4                |
| UTL1103G1P20AWG | Inline receptacle        | Male power   | 20           | 0.5 | -               | -               | 1               | -               | -               | -               | -               | -               | 4                | 2                | -                | -                | -                | -                |
| UTL1103G1P16AWG | Inline receptacle        | Male power   | 16           | 1.5 | -               | -               | 1               | -               | -               | -               | -               | -               | -                | -                | 4                | 2                | -                | -                |
| UTL1103G1P14AWG | Inline receptacle        | Male power   | 14           | 2.5 | -               | -               | 1               | -               | -               | -               | -               | -               | -                | -                | -                | -                | 4                | 2                |
| UTL1103G1S20AWG | Inline receptacle        | Female power | 20           | 0.5 | -               | -               | -               | 1               | -               | -               | -               | -               | 2                | 4                | -                | -                | -                | -                |
| UTL1103G1S16AWG | Inline receptacle        | Female power | 16           | 1.5 | -               | -               | -               | 1               | -               | -               | -               | -               | -                | -                | 2                | 4                | -                | -                |
| UTL1103G1S14AWG | Inline receptacle        | Female power | 14           | 2.5 | -               | -               | -               | 1               | -               | -               | -               | -               | -                | -                | -                | -                | 2                | 4                |
| UTL7103G1P20AWG | Jam nut receptacle       | Male power   | 20           | 0.5 | -               | -               | -               | -               | 1               | -               | -               | -               | 4                | 2                | -                | -                | -                | -                |
| UTL7103G1P16AWG | Jam nut receptacle       | Male power   | 16           | 1.5 | -               | -               | -               | -               | 1               | -               | -               | -               | -                | -                | 4                | 2                | -                | -                |
| UTL7103G1P14AWG | Jam nut receptacle       | Male power   | 14           | 2.5 | -               | -               | -               | -               | 1               | -               | -               | -               | -                | -                | -                | -                | 4                | 2                |
| UTL7103G1S20AWG | Jam nut receptacle       | Female power | 20           | 0.5 | -               | -               | -               | -               | -               | 1               | -               | -               | 2                | 4                | -                | -                | -                | -                |
| UTL7103G1S16AWG | Jam nut receptacle       | Female power | 16           | 1.5 | -               | -               | -               | -               | -               | 1               | -               | -               | -                | -                | 2                | 4                | -                | -                |
| UTL7103G1S14AWG | Jam nut receptacle       | Female power | 14           | 2.5 | -               | -               | -               | -               | -               | 1               | -               | -               | -                | -                | -                | -                | 2                | 4                |
| UTL0103G1P20AWG | Square flange receptacle | Male power   | 20           | 0.5 | -               | -               | -               | -               | -               | -               | 1               | -               | 4                | 2                | -                | -                | -                | -                |
| UTL0103G1P16AWG | Square flange receptacle | Male power   | 16           | 1.5 | -               | -               | -               | -               | -               | -               | 1               | -               | -                | -                | 4                | 2                | -                | -                |
| UTL0103G1P14AWG | Square flange receptacle | Male power   | 14           | 2.5 | -               | -               | -               | -               | -               | -               | 1               | -               | -                | -                | -                | -                | 4                | 2                |
| UTL0103G1S20AWG | Square flange receptacle | Female power | 20           | 0.5 | -               | -               | -               | -               | -               | -               | -               | 1               | 2                | 4                | -                | -                | -                | -                |
| UTL0103G1S16AWG | Square flange receptacle | Female power | 16           | 1.5 | -               | -               | -               | -               | -               | -               | -               | 1               | -                | -                | 2                | 4                | -                | -                |
| UTL0103G1S14AWG | Square flange receptacle | Female power | 14           | 2.5 | -               | -               | -               | -               | -               | -               | -               | 1               | -                | -                | -                | -                | 2                | 4                |

## Evaluation kit 6 contacts part number (102G1W3)

Evaluation kit is composed of 1 connector, contacts and 1 heat shrink boot for a quick and easy assembly production.

Evaluation kit is the solution for a quick prototyping, please note that the IP level of the evaluation kit is IP67.

| Part number       | Connector type     | Gender       | Wire section |     | UTL6102G1W3P16AWG | UTL6102G1W3S16AWG | UTL1102G1W3P16AWG | UTL1102G1W3S16AWG | UTL7102G1W3P16AWG | UTL7102G1W3S16AWG | Heat shrink boot | SM20WL3S26 | SC20WL3S25 | SM24WL3S26 | SC24WL3S25 | SM16ML1S31 | SC16ML1S31 | SM14ML1S31 | SC14ML1S31 |
|-------------------|--------------------|--------------|--------------|-----|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------|------------|------------|------------|------------|------------|------------|------------|
|                   |                    |              | AWG          | mm² |                   |                   |                   |                   |                   |                   |                  |            |            |            |            |            |            |            |            |
| UTL6102G1W3P16AWG | Plug               | Male power   | 16           | 1.5 | 1                 | -                 | -                 | -                 | -                 | -                 | 1                | 1          | -          | 3          | -          | 3          | 2          | -          | -          |
| UTL6102G1W3P14AWG | Plug               | Male power   | 14           | 2.5 | 1                 | -                 | -                 | -                 | -                 | -                 | 1                | 1          | -          | 3          | -          | -          | -          | 3          | 2          |
| UTL6102G1W3S16AWG | Plug               | Female power | 16           | 1.5 | -                 | 1                 | -                 | -                 | -                 | -                 | 1                | -          | 1          | -          | 3          | 2          | 3          | -          | -          |
| UTL6102G1W3S14AWG | Plug               | Female power | 14           | 2.5 | -                 | 1                 | -                 | -                 | -                 | -                 | 1                | -          | 1          | -          | 3          | -          | -          | 2          | 3          |
| UTL1102G1W3P16AWG | Inline receptacle  | Male power   | 16           | 1.5 | -                 | -                 | 1                 | -                 | -                 | -                 | 1                | 1          | -          | 3          | -          | 3          | 2          | -          | -          |
| UTL1102G1W3P14AWG | Inline receptacle  | Male power   | 14           | 2.5 | -                 | -                 | 1                 | -                 | -                 | -                 | 1                | 1          | -          | 3          | -          | -          | -          | 3          | 2          |
| UTL1102G1W3S16AWG | Inline receptacle  | Female power | 16           | 1.5 | -                 | -                 | -                 | 1                 | -                 | -                 | 1                | -          | 1          | -          | 3          | 2          | 3          | -          | -          |
| UTL1102G1W3S14AWG | Inline receptacle  | Female power | 14           | 2.5 | -                 | -                 | -                 | 1                 | -                 | -                 | 1                | -          | 1          | -          | 3          | -          | -          | 2          | 3          |
| UTL7102G1W3P16AWG | Jam nut receptacle | Male power   | 16           | 1.5 | -                 | -                 | -                 | -                 | 1                 | -                 | -                | 1          | -          | 3          | -          | 3          | 2          | -          | -          |
| UTL7102G1W3P14AWG | Jam nut receptacle | Male power   | 14           | 2.5 | -                 | -                 | -                 | -                 | 1                 | -                 | -                | 1          | -          | 3          | -          | -          | -          | 3          | 2          |
| UTL7102G1W3S16AWG | Jam nut receptacle | Female power | 16           | 1.5 | -                 | -                 | -                 | -                 | -                 | 1                 | -                | -          | 1          | -          | 3          | 2          | 3          | -          | -          |
| UTL7102G1W3S14AWG | Jam nut receptacle | Female power | 14           | 2.5 | -                 | -                 | -                 | -                 | -                 | 1                 | -                | -          | 1          | -          | 3          | -          | -          | 2          | 3          |

## Evaluation kit 8 contacts part number (122G1W5)

Evaluation kit is composed of 1 connector, contacts and 1 heat shrink boot for a quick and easy assembly production.

Evaluation kit is the solution for a quick prototyping, please note that the IP level of the evaluation kit is IP67.

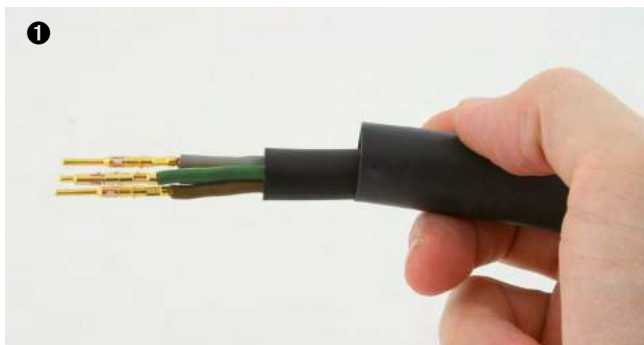
| Part number       | Connector type     | Gender       | Wire section |     | UTL6122G1W5P | UTL6122G1W5S | UTL1122G1W5P | UTL1122G1W5S | UTL7122G1W5P | UTL7122G1W5S | Heat shrink boot | SM20WL3S26 | SC20WL3S25 | SM24WL3S26 | SC24WL3S25 | SM16ML1S31 | SC16ML1S31 | SM14ML1S31 | SC14ML1S31 |
|-------------------|--------------------|--------------|--------------|-----|--------------|--------------|--------------|--------------|--------------|--------------|------------------|------------|------------|------------|------------|------------|------------|------------|------------|
|                   |                    |              | AWG          | mm² |              |              |              |              |              |              |                  |            |            |            |            |            |            |            |            |
| UTL6122G1W5P16AWG | Plug               | Male power   | 16           | 1.5 | 1            | -            | -            | -            | -            | -            | 1                | 2          | -          | 5          | -          | 3          | 2          | -          | -          |
| UTL6122G1W5P14AWG | Plug               | Male power   | 14           | 2.5 | 1            | -            | -            | -            | -            | -            | 1                | 2          | -          | 5          | -          | -          | -          | 3          | 2          |
| UTL6122G1W5S16AWG | Plug               | Female power | 16           | 1.5 | -            | 1            | -            | -            | -            | -            | 1                | -          | 2          | -          | 5          | 2          | 3          | -          | -          |
| UTL6122G1W5S14AWG | Plug               | Female power | 14           | 2.5 | -            | 1            | -            | -            | -            | -            | 1                | -          | 2          | -          | 5          | -          | -          | 2          | 3          |
| UTL1122G1W5P16AWG | Inline receptacle  | Male power   | 16           | 1.5 | -            | -            | 1            | -            | -            | -            | 1                | 2          | -          | 5          | -          | 3          | 2          | -          | -          |
| UTL1122G1W5P14AWG | Inline receptacle  | Male power   | 14           | 2.5 | -            | -            | 1            | -            | -            | -            | 1                | 2          | -          | 5          | -          | -          | -          | 3          | 2          |
| UTL1122G1W5S16AWG | Inline receptacle  | Female power | 16           | 1.5 | -            | -            | -            | 1            | -            | -            | 1                | -          | 2          | -          | 5          | 2          | 3          | -          | -          |
| UTL1122G1W5S14AWG | Inline receptacle  | Female power | 14           | 2.5 | -            | -            | -            | 1            | -            | -            | 1                | -          | 2          | -          | 5          | -          | -          | 2          | 3          |
| UTL7122G1W5P16AWG | Jam nut receptacle | Male power   | 16           | 1.5 | -            | -            | -            | -            | 1            | -            | -                | 2          | -          | 5          | -          | 3          | 2          | -          | -          |
| UTL7122G1W5P14AWG | Jam nut receptacle | Male power   | 14           | 2.5 | -            | -            | -            | -            | 1            | -            | -                | 2          | -          | 5          | -          | -          | -          | 3          | 2          |
| UTL7122G1W5S16AWG | Jam nut receptacle | Female power | 16           | 1.5 | -            | -            | -            | -            | -            | 1            | -                | -          | 2          | -          | 5          | 2          | 3          | -          | -          |
| UTL7122G1W5S14AWG | Jam nut receptacle | Female power | 14           | 2.5 | -            | -            | -            | -            | -            | 1            | -                | -          | 2          | -          | 5          | -          | -          | 2          | 3          |

## Evaluation kit

### Assembly instructions

The boot is semi-flexible and heat-shrinkable with a moldable adhesive inner lining.

- Place the heat shrink boot over the cable
- Strip the cable jacket (see pages 46 to 48)
- Strip the individual wires (see page 49)
- Crimp the contacts (see pages 52 & 53) ❶
- Place the contacts in their cavities, checking the retention by slightly pulling the cable ❷
- Clean the connector surface and the cable jacket with isopropyl alcohol  
(Note: It is advised to rub the jacket with sand paper and clean the jacket before shrinking the boot)
- Position the boot over the rear threads ❸
- Heat the boot with a heat gun: minimum shrink temp: 80°C - minimum full recovery temp: 110°C make sure to apply the heat evenly around the boot. Starting by applying the heat from the rear of the connector. ⚠  
Do not apply excessive heat, as it will damage the connector and/or boot.
- Let the boot cool down ❺
- Check for good retention and the boot glue grip ❻.

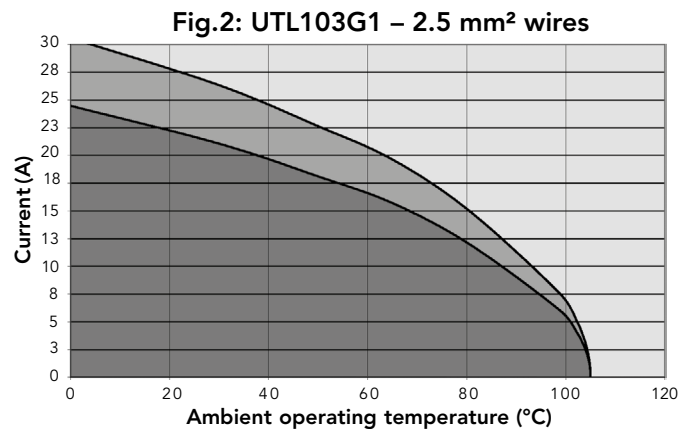
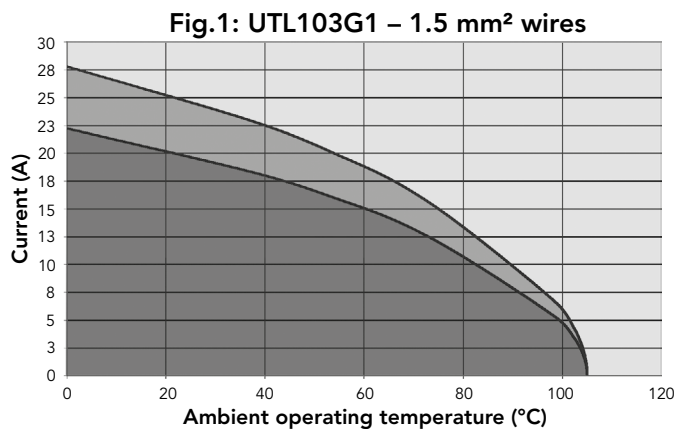


## Rated current & working voltage

### Current carrying capacity

The current carrying capacity of a connector is limited by the thermal properties of materials used in its construction. The amount of current that can be handled depends on the size of cable used, the ambient temperature and the heat that is generated inside the connector. Part 3 of the IEC 60512 standard determines through a derating curve, the maximum current permissible, which varies from one layout to another (Fig.1 & Fig.2). Wire size plays an important role as well, since they help to dissipate heat and avoid overheating (Fig.1 & Fig.2).

Please note that the curve should be adjusted when dealing with potential hot spots, which can occur as a result of unequal loading of current across a number of contacts. As a general rule, it is best to avoid locating power handling contacts in the middle of the connector; try to locate them towards the edge where heat can be dissipated more effectively. Eventually you should find a level which represents the permissible operating range:



Theoretic current use
  Limited use
  Not recommended use

The **rated current** is defined as uninterrupted continuous current that a connector can take when all contacts are energized simultaneously without exceeding the maximum limit of temperature. The ground contact is never loaded.

## UV resistance

### UV resistance

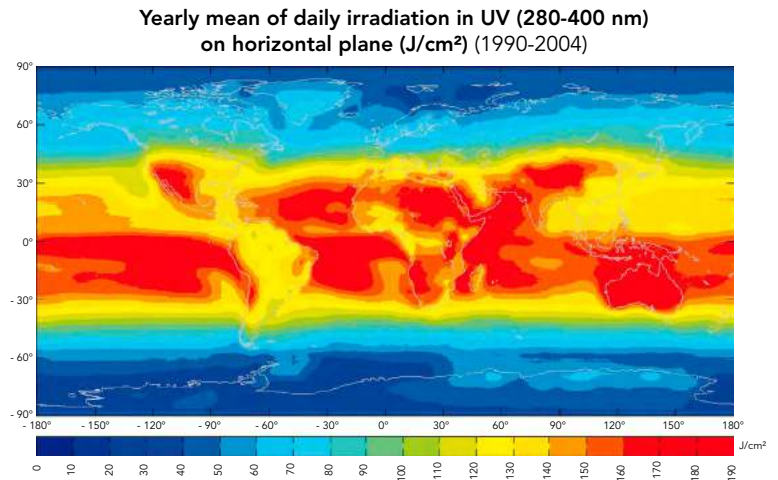
Solar radiation affects all materials, but plastics can be susceptible to extreme degradation over time. The choice of materials for the UTL series was therefore a critical consideration.

All over the world we are not exposed to the same amount of energy given by the sun. The chart shown here clearly illustrates this.

So we performed test according to the ISO 4892-2 and simulated 5 years exposure to outdoor environments (temperature, humidity, etc...).

After this period there was no significant colour variation, no crazing, no cracking and no major variation of mechanical properties.

In addition, to that we asked UL to perform UV test per the UL746C. Our material has been rated F1 which is the highest level in this standard.



## UL94 + UL1977

Underwriter laboratories



There are two main standards for industrial connectors: UL94 & UL1977

### UL 94: Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

This standard is dedicated to plastics flammability. It characterizes how the material burns in various orientation and thicknesses. Whereas most of our competitors are using a 50W test to classify the ability of their solution to withstand fire, SOURIAU decided to increase this to a 500W test. New regulations tend to emphasize the importance of burning behavior making the 50W test less and less relevant.

The UTL series has been rated at 5VA.

Procedure: Bar specimens are to be  $125 \pm 5$  mm long by  $13 \pm 0.5$  mm wide, and provided in the minimum thickness.

Plaque specimens are to be  $150 \pm 5$  mm by  $150 \pm 5$  mm and provided in the minimum thickness.

Thicker specimens may also be provided and shall be tested if the results obtained on the minimum thickness indicate inconsistent test results. The maximum thickness is not to exceed 13 mm.

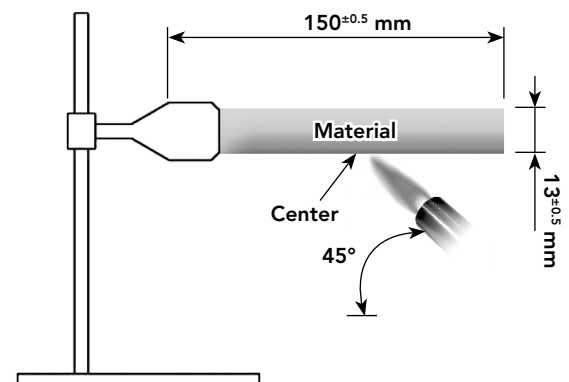
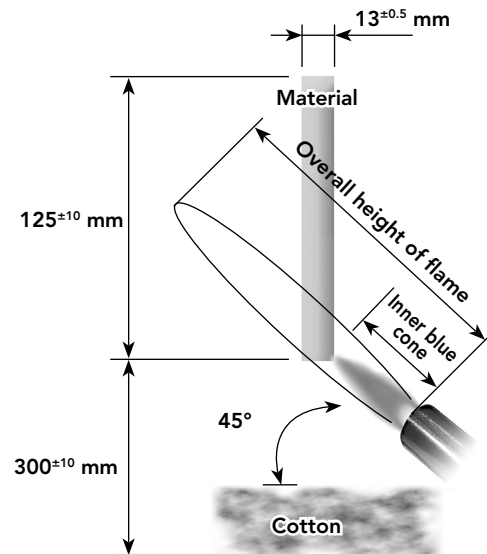
| Conditions                                                                                         | 5VA         |
|----------------------------------------------------------------------------------------------------|-------------|
| Afterflame time plus afterglow time after fifth flame application for each individual bar specimen | $\leq 60$ s |
| Cotton indicator ignited by flaming particles or drops from any bar specimen                       | No          |
| Burn-through (hole) of any plaque specimen                                                         | No          |

#### 5VA Vertical burning:

- The specimen is clamped from the upper 6 mm of the specimen, with the longitudinal axis vertical, so that the lower end of the specimen is  $300 \pm 10$  mm above a horizontal layer of not more than 0.08 g of absorbent cotton thinned to approximately 50 x 50 mm and a maximum thickness of 6 mm.
- The 500W flame is then to be applied to one of the lower corners of the specimen so that the tip of the blue cone is within 0 to 3 mm of the specimen edge.
- Apply the flame for  $5 \pm 0.5$  seconds and then remove for  $5 \pm 0.5$  seconds. Repeat the operation until the specimen has been subjected to five applications of the test flame.

#### 5VA Horizontal burning:

- Support the plaque specimen by a clamp in the horizontal plane.
- The flame is then to be applied to the centre of the bottom surface of the plaque so that the tip of the blue cone is within 0 to 3 mm of the plaque surface.
- Apply the flame for  $5 \pm 0.5$  seconds and then remove for  $5 \pm 0.5$  seconds. Repeat the operation until the plaque specimen has been subjected to five applications of the test flame.
- After the fifth application of the test flame, and after all flaming or glowing combustion has ceased, it is to be observed whether or not the flame penetrated (burned through) the plaque material. In addition, no opening greater than 3 mm shall appear after the test.



## UL94 + UL1977

Underwriter laboratories 

### UL1977

There are several standards which deal with plug and receptacle. Each of them is only for a small area of applications. It could be telecommunication, etc. The UL 1977 covers single and multipole connectors intended for factory assembly.

Requirements apply to devices taking into account intensity and voltage. The categories are as follows:

|        | 0       | 30 V<br>(42 V peak) | 600 V |
|--------|---------|---------------------|-------|
| 0      | Type 0  | Type 1A             |       |
| 8.3 A  |         | Type 2              |       |
| 31 A   | Type 1B | Type 3              |       |
| 200 A  |         | Type 4              |       |
| 1000 A |         |                     |       |

According to above table, the level of performance that has to be reached could be different. Most of them are explained in the following page.

### Insulating materials:

Material uses for electrical insulation, as a minimum, have to comply with the characteristics shown below:

#### • Minimum ratings for polymeric materials

| Type | Flame rating | Relative thermal index (RTI)<br>Electrical/mechanical w/o impact ** |
|------|--------------|---------------------------------------------------------------------|
| 0    | -            | 50/50                                                               |
| 1A   | HB           | 50/50                                                               |
| 1B   | HB           | 50/50                                                               |
| 2    | HB           | 50/50                                                               |
| 3    | HB           | 50/50                                                               |
| 4    | HB           | 50/50                                                               |

\* The RTI of the material shall not be lower than the temperature measured during the Temperature Test.

\*\* For a thickness less than that for which a value has been established, the RTI of the minimum thickness with an established value shall be used.

### Assembly:

Connector has to be keyed to prevent any mismatching that can damage the machine or hurt the user. In the same way, plugs and sockets have to be equipped to protect persons against contact with live parts.

Finally the identified grounding contact shall be located so that the corresponding electrical continuity has to be completed before any other contact.

## UL94 + UL1977

Underwriter laboratories 

## UL1977

## Spacing:

For a 250V max connector, distance through air or over material shall be 1.2mm whereas from 250V to 600V connector the spacing is 3.2mm minimum. These distances have to be taken between uninsulated live parts as shown in the matrix below:

## • Applicability of spacing requirements

| Type | Uninsulated live part - uninsulated live part of opposite polarity | Uninsulated live part - uninsulated grounded metal part | Uninsulated live part - exposed dead metal part |
|------|--------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------|
| 0    | No                                                                 | No                                                      | No                                              |
| 1A   | Yes                                                                | Yes                                                     | Yes                                             |
| 1B   | Yes                                                                | Yes                                                     | No                                              |
| 2    | Yes                                                                | Yes                                                     | Yes                                             |
| 3    | Yes                                                                | Yes                                                     | Yes                                             |
| 4    | Yes                                                                | Yes                                                     | Yes                                             |

An alternative way to determine voltage rating is with the Dielectric-Withstand test. If during one minute there is no arc-over or breakdown the rated voltage is given as shown below:

- a) 500 volts for a type 1B device
- b) 1000 volts plus twice rated voltage for types 1A, 2, 3 and 4 devices.

## Marking:

A device shall be legibly marked with the manufacturer's trade name, trade mark, or other descriptive marking by which the organization responsible for the product may be identified. (Exception: If the device is too small, or where the legibility would be difficult to attain, the manufacturer's name, trademark, or other descriptive marking may appear on the smallest unit container or carton)

The following shall be marked on the device or on the smallest unit container or carton or on a stuffer sheet in the smallest unit container or carton:

- a) The catalog number or an equivalent designation
- b) The electrical rating in both volts and amperes, if assigned
- c) Whether ac or dc, if restricted
- d) Flammability class, if identified

Example : **10A 500V UL94 V-0**

## IEC 61984 & IP codes explained

### IEC 61984

The norm is dedicated to connectors with rated voltage above 50V and up to 1000V and rated currents up to 125A per contact. Depending on your application connectors could be compliant with another standard. This has to be double checked with the customer.

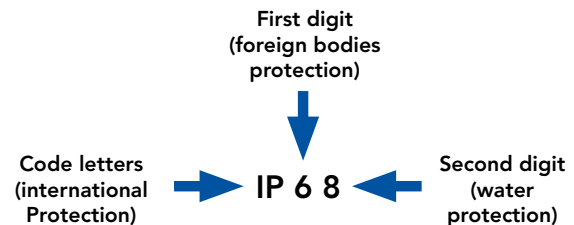
There are a lot of constructional requirements and performances specified in that standard. Most of them are illustrated in greater details hereafter.

### Provisions for earthing:

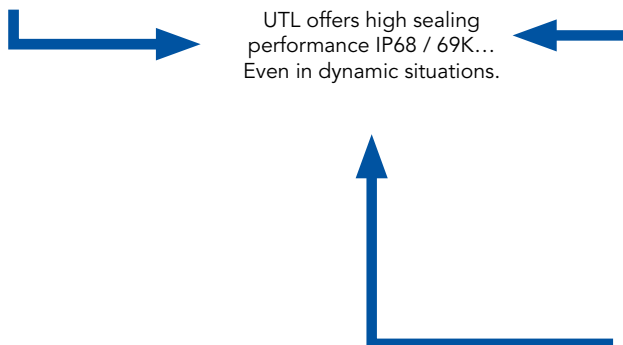
The UTL connector is intended to be used on Class I,II and III systems (See IEC 61140) . Not like a typical connector, the UTL can be used to interrupt current. The "First mate Last break" contact feature is built in so any regular contact will ensure the functionality. Critically, among all of the normal assumptions we make in designing a connector, this contact has to be considered as a live part and must be protected against electric shock by double or reinforced insulation.

### IP code:

IP is a coding system defined by the IEC 60529 to indicate the degrees of protection provided by an enclosure. The aim of this is to give information regarding the accessibility of live parts against ingress of water and other foreign bodies.



| 1 <sup>st</sup> digit | Degree of protection                                                                                                                                                | 2 <sup>nd</sup> digit | Degree of protection                                                           |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------|
| 0                     | No protection against accidental contact.<br>No protection against solid foreign bodies.                                                                            | 0                     | No protection against water.                                                   |
| 1                     | Protection against contact with any large area by hand and against large solid foreign bodies with a diameter bigger than 50 mm.                                    | 1                     | Drip-proof.<br>Protection against vertical water drips.                        |
| 2                     | Protection against contact with the fingers.<br>Protection against solid foreign bodies with a diameter bigger than 12 mm.                                          | 2                     | Drip-proof.<br>Protection against water drips up to a 15° angle.               |
| 3                     | Protection against tools, wires or similar objects with a diameter bigger than 2.5 mm.<br>Protection against small solid bodies with a diameter bigger than 2.5 mm. | 3                     | Spray-proof.<br>Protection against diagonal water drips up to a 60° angle.     |
| 4                     | Same as 3 however diameter is bigger than 1 mm.                                                                                                                     | 4                     | Splash-proof.<br>Protection against splashed water from all directions.        |
| 5                     | Full protection against contact. Protection against interior injurious dust deposits.                                                                               | 5                     | Hose-proof.<br>Protection against water (out of a nozzle) from all directions. |
| 6                     | Total protection against contact.<br>Protection against penetration of dust.                                                                                        | 6                     | Protection against temporary flooding.                                         |
|                       |                                                                                                                                                                     | 7                     | Protection against temporary immersions.                                       |
|                       |                                                                                                                                                                     | 8                     | Protection against water pressure.<br>Pressure to be specified by supplier.    |



In addition to the IEC 60529 we conjointly use the DIN 40050 part 9 which is dedicated to road vehicles. The main differences are:

- **First digit:** 5 replaced by 5K, 6 by 6K. In the DIN the tested equipment is not depressurized as it is in the IEC.
- **Second digit:** 5K and 6K has been added and are equivalent respectively to 5 and 6 but with higher pressure. 9K which represents the High pressure cleaning.

|    |                                                                                                            |
|----|------------------------------------------------------------------------------------------------------------|
| 9K | High pressure hose-proof.<br>Protection against high pressure water (out of a nozzle) from all directions. |
|----|------------------------------------------------------------------------------------------------------------|

## IEC 61984 & IP codes explained

### IEC 61984

#### Overvoltage

UTL connectors are qualified to be used on systems rated at Overvoltage category III

Per the IEC 60664-1 (formerly VDE 0110) each category is linked to the end application and where the device will be implemented:

- **Category IV** (primary overcurrent protection equipment):  
Origin of the installation
- **Category III** (Any fixed installation with a permanent connection)  
Fixed installation and equipment and for cases where the reliability and the availability is subject to special requirements
- **Category II** (Domestic appliances):  
Energy consuming equipment to be supplied from the fixed installation
- **Category I** (Protected electronic circuit):  
For connection to circuit in which measurements are taken to limit transient overvoltage.

#### Pollution degree

Per the IEC 60664-1 (formerly VDE 0110) the environment affects the performance of the insulation. Particles can build a bridge between two metal parts. As a rule dust mixed with water can be conductive and more generally speaking metal dust is conductive. Finally, the standard defines 4 levels of pollution:

- **Degree 1** (Air conditioned dry room):  
No pollution or only dry, non conductive pollution occurs. The pollution has no influence.
- **Degree 2** (Personal computer in a residential area):  
Only non conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is to be expected.
- **Degree 3** (Machine tools):  
Conductive pollution occurs or dry non-conductive pollution occurs which becomes conductive due to condensation which is to be expected.
- **Degree 4** (Equipment on roofs, locomotives):  
Continuous conductivity occurs due to conductive dust, rain or other wet conditions.

Finally, the harsher the environment is, the longer clearance and creepage distances should be. Nonetheless, according the IEC 61984, enclosure rated at IP54 or higher can be dimensioned for a lower pollution degree. This applies to mated connectors disengaged for test and maintenance.

#### Marking

The marking should give enough details to the user to know what the main characteristics are and without going deep in technical documentation. Below examples identify the suitability of the connector:

- **Example 1:**  
Marking of a connector with rated current 16A, rated voltage 400V, rated impulse voltage 6kV and pollution degree 3, 2 and 1 for use in any system, preferably unearthened or delta-earthed systems:

16A 400V 6kV 3

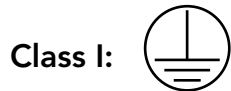
- **Example 2:**  
Marking of a connector with rated current 16A, rated insulation voltages line-to-earth 250V, line-to-line 400V, rated impulse voltage 4kV and pollution degree 3, 2 and 1 for use in earthed systems:

16A 250V 400V 4kV 3

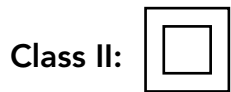
## IEC 61140 explained

### IEC 61140

On a daily basis, we are using many electrical appliances, some are grounded, and some are not. The levels of grounding protection are clearly defined by the International Electrotechnical Commission standard IEC 61140, a standard that has an influence on our connectors and how they should be used; our customers therefore need to pay particular attention to the three categories defined within this standard to ensure compatibility with their system. Everything explained hereafter is valid for connectors not intended to interrupt current.

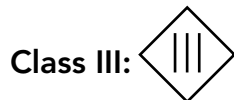


Devices which belong to this category have their chassis grounded via the ground wire (green/yellow in Europe, green in the US, Canada and Japan). A fault in the appliance might cause a live conductor to energize the casing. In this case, the current flows to the ground conductor and the circuit interrupter will cut off the power supply. In case of the UTL series, the envelope cannot become live since it is made in plastic. There is no special care to be taken to attach the connector shell to the ground.



Products in this category have reinforced insulation, meaning that the casing does not need to be connected to ground. In this case, the possibility of electric shock has been removed. Most of the time, reinforced insulation means double insulation, i.e. the second layer will take over the first one in case the first one fails. The UTL series could be used in that condition. We recommend to contact SOURIAU for further explanation.

Note: UL 1310 also defines a class II device, but in that case this is just to set the upper limit of use, like a wall charger for our cell phone.



In this category, electrical appliances are fed by a low voltage source (<48VAC or <120VDC). In normal conditions live conductors can be accessible without any risk for the end user. No particular attention needs to be taken in regards to UTL series when it comes to a class III device.

### Conclusion :

UTL series can be used in Class I, II or III environments but each category affects the product performance. Throughout the catalog, current and voltage ratings have been given for class I devices keeping in mind the ground conductor needs to be attached according to recommended wiring instructions.

Note: Special applications like recreational vehicles are not under the scope of the IEC 61140.

## What is NEMA rating?

- NEMA ratings vs IP ratings

Whereas IP ratings only consider protection against ingress of foreign bodies (first digit) and ingress of water (second digit), NEMA ratings consider these but also verify protection from external ice, corrosive materials, oil immersion, etc.

The correlation between NEMA & IP being limited only to dust and water, we can state that a NEMA type is equivalent to an IP rating but it is not possible to say the contrary.

Below a list of some NEMA standards:

| Enclosure rating | IP20 | IP22 | IP55 | IP64 | IP65 | IP66 | IP67 |
|------------------|------|------|------|------|------|------|------|
| Type 1           | •    |      |      |      |      |      |      |
| Type 3           |      |      |      | •    |      |      |      |
| Type 3R          |      | •    |      |      |      |      |      |
| Type 3S          |      |      |      | •    |      |      |      |
| Type 4           |      |      |      |      |      | •    |      |
| Type 4X          |      |      |      |      |      | •    |      |
| Type 6           |      |      |      |      |      |      | •    |
| Type 12          |      |      | •    |      |      |      |      |
| Type 13          |      |      |      |      | •    |      |      |

- indicates compliance

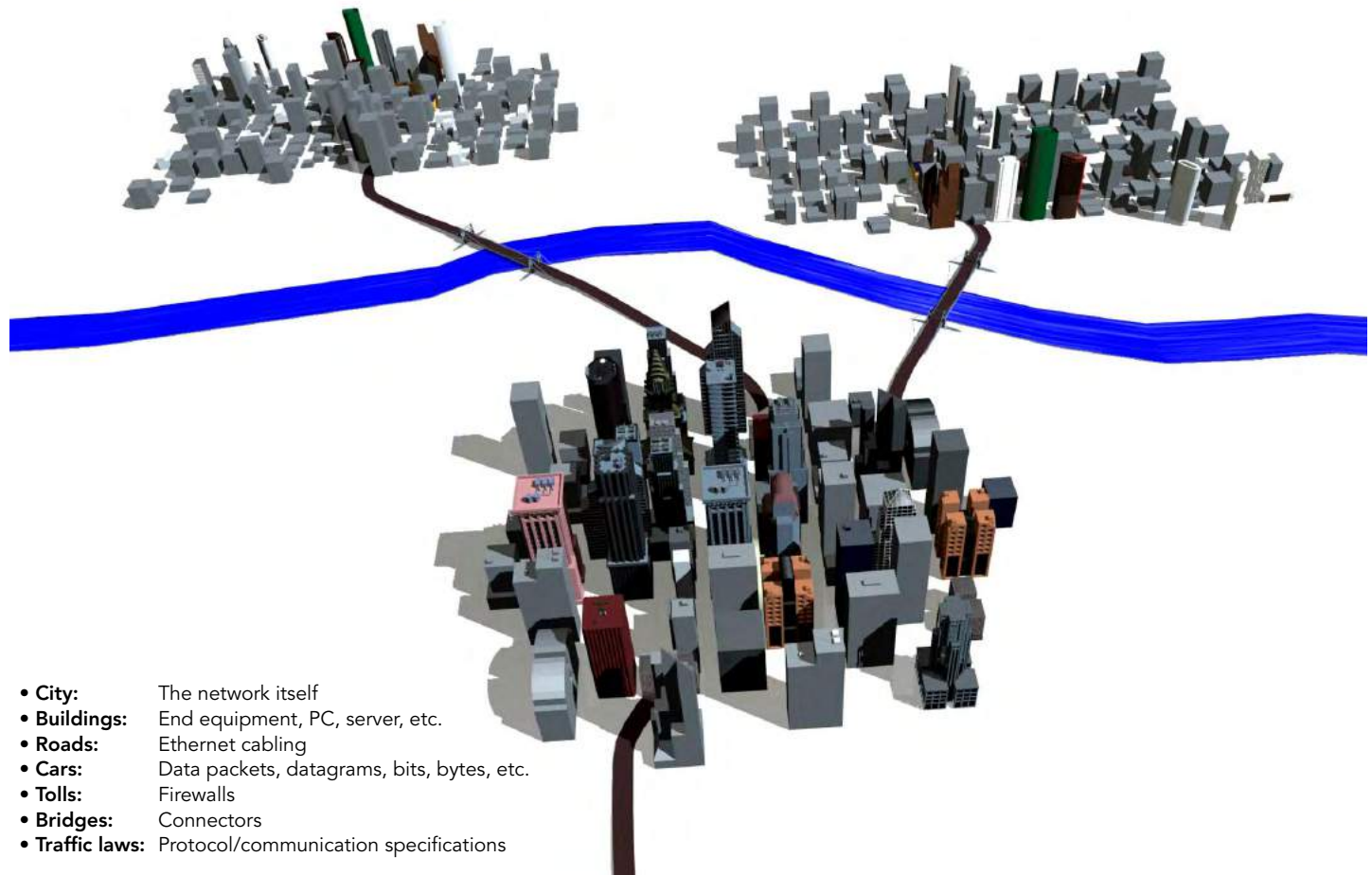


Type 6 rating can be either Type 6 or Type 6P - please see below:

|    |      |                                                                                                                                                                                                                                                                                                                               |
|----|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6  | IP67 | Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment, falling dirt, hose-directed water, the entry of water during <b>occasional temporary</b> submersion at a limited depth and damage from external ice formation. |
| 6P | IP67 | Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment, falling dirt, hose-directed water, the entry of water <b>during prolonged</b> submersion at a limited depth and damage from external ice formation.            |

## Ethernet for the Layman

In order to explain basic Ethernet theory, we can use a functional comparison to a busy city with highways, buildings and cars. To illustrate this, the table below provides correlation between the different components/pieces/links that encompass Ethernet network connectivity, and the larger scale infrastructure of a metropolitan city.



## Ethernet basics

Ethernet is a widely used communications protocol that is used to transmit data packets (datagrams) between network devices. Imagine a highway in a large metropolitan area six lanes wide at rush hour. The vehicles on the highway need rules to follow so that they get to their destination without crashing into each other. In an Ethernet network link, there could be 100 million bits of information transmitted in one second. In the Ethernet standard, there exist rules to govern packet structure, transmission requirements, error correction, communication with end equipment, etc.

## Examining the differences between 100Mhz, 100 Base TX, Cat5e/Cat6. What does it all mean?

When discussing connectors and Ethernet, there are a few key details to be aware of:

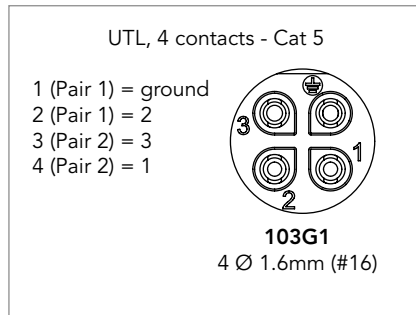
- 100Mhz is a measurement of Frequency for the signal
  - Comparable to the Speed Limit of a highway
- 100BaseTX (or Fast Ethernet) is an Ethernet link standard and identifies available link bandwidth. The bandwidth is measured in units of Mbits/S (megabits per second)
  - Comparable to the number of cars that pass a point in one second
- Cat5e/Cat6 are an EIA/TIA standard for performance and physical characteristics for cables and connectors
  - Comparable to performance specifications of the car and highway.

In connectors and cables, Fast Ethernet uses 2 pairs. One for transmit and one for receive. This way data traffic can flow in both directions simultaneously.

## Ethernet for the Layman

### SOURIAU offering:

Standard solutions.



### What about using coax contacts?

Ethernet twisted pairs carry a symmetrical (balanced) signal. Once terminated into a coax contact, the inner core will be protected by a shield - but not the outer contact. Because of EMI issues, the signal will no longer be balanced. Conclusion - it does not work and is not recommended.

### What about using Quadrax contacts?

The Quadrax contact is used in railway applications because of the use of quad cable. In this specific market, the standard Ethernet twisted pairs wires cannot be offered, they are too thin and often solid (not stranded).

In the rest of industry, UTP (Unshielded Twisted Pairs) cables are widely used. The Quadrax contact is not designed to terminate them. And thus, are not advised for industrial applications.

### Conclusion

To carry 100Mb/s data signal, 100BaseTX or Fast Ethernet recommends the use of Cat5e connectors as well as Cat5e cable with the support of a 100MHz signal. Nevertheless, a 100Mb/s signal can be transmitted in certain conditions (short distance, only one connector, lower frequency but a different code) thru many other connection materials - not necessarily Cat5e rated.

## RS-485 for the Layman

RS-485 signals are used in a wide range of applications (from computers and networks to building automation and stage lighting). In addition, it may be used to control video surveillance systems or to interconnect security control panels and devices such as access control card readers.

### RS-485 basics

RS-485 only specifies electrical characteristics of the generator and the receiver. It does not specify or recommend any communications protocol, only the physical layer. An RS-485 network consists of a single controller (the master) and 1 up to 32 slave devices (the receivers). For example, a lighting console is frequently employed as the controller for a network of slave devices like dimmers, fog machines and intelligent lights.

### Physical layer

The standard transmission medium is twisted-pair cable of either #22 or #24 AWG solid wire. Typically, a minimum of two lines are used but a third reference wire may be accommodated. Four-wire cables can also be used if full-duplex operation is desired. The cables may be shielded or unshielded, with unshielded the most common.

The nominal characteristic impedance is 100 or 120  $\Omega$ . It also defines three generator interface points (signal lines); "A", "B" and "C". The data is transmitted on "A" and "B" with "C" being used as a ground reference.

Terminating load resistors are required to ensure a matched line condition. Without terminating load resistors, reflections of fast driver edges can cause multiple data edges and subsequent data/signal corruption.

### What is DMX?

The DMX, or Digital Multiplex, is the protocol for stage lighting applications using the RS-485 standard.

### Example of a DMX simple network

Controller (the master)



Light (1st slave)



Light (2nd slave)

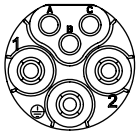


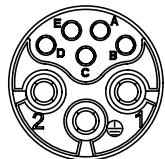
Light (3th slave)



Terminating Resistor

### SOURIAU offering:

| Duplex                                          |                                                                                     |
|-------------------------------------------------|-------------------------------------------------------------------------------------|
| UTL, 6 contacts - Power + RS 485 1 Twisted pair |                                                                                     |
| 1 (Pair 1) = A<br>2 (Pair 1) = B<br>Ground = C  |  |
| Phase = 1<br>Neutral = 2<br>Ground = Ground     | <b>102G1W3</b><br>3 $\varnothing$ 1.0mm (#20)<br>3 $\varnothing$ 1.6mm (#16)        |

| Full Duplex                                                                        |                                                                                      |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| UTL, 8 contacts - Power + RS 485 2 Twisted pairs                                   |                                                                                      |
| 1 (Pair 1) = A<br>2 (Pair 1) = B<br>3 (Pair 2) = E<br>4 (Pair 2) = D<br>Ground = C |  |
| Phase = 1<br>Neutral = 2<br>Ground = Ground                                        | <b>122G1W5</b><br>5 $\varnothing$ 1.0mm (#20)<br>3 $\varnothing$ 1.6mm (#16)         |

## Notes

# UTL SERIES

# Appendices

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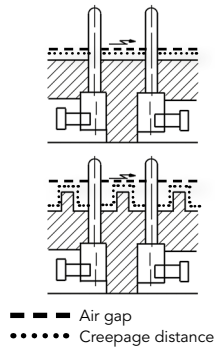
## Glossary of terms

### • Clearance

Per the IEC 60664-1 it is the shortest distance between two conductive parts even over the air.

### • Creepage distance

Per the IEC 60664-1 it represents the shortest distance along the surface of the insulating material between two conductive parts.



### • Working voltage

Per the IEC 60664-1 it is the highest r.m.s. value of A.C. or D.C. voltage across any particular insulation which can occur when the equipment is supplied at rated voltage.

### • Rated impulse voltage

Impulse withstands voltage value assigned by the manufacturer to the equipment or to a part of it characterizing the specified withstand capability of its insulation against transient overvoltage.

### • Working current

It is the maximum continuous and not interrupted current able to be carried by all contacts without exceeding the maximum temperature of the insulating material.

### • Transient voltage

Extract from the IEC 60664-1: Short duration overvoltage of a few millisecond or less, oscillatory or non-oscillatory, usually highly damped.

### • CTI (Comparative Tracking Index)

The CTI value is commonly used to characterize the electrical breakdown properties of an insulating material. It allows users to know the tendency to create creepage paths. This value represents the maximum voltage after 50 drops of ammonium chloride solution without any breakdown.

### • RTI (Relative Temperature Index):

Extract from ULs website:

Maximum service temperature for a material, where a class of critical property will not be unacceptably compromised through chemical thermal degradation, over the reasonable life of an electrical product, relative to a reference material having a confirmed, acceptable corresponding performance defined RTI.

- **RTI Elec:** Electrical RTI, associated with critical electrical insulating properties.

- **RTI Mech Imp:** Mechanical Impact RTI, associated with critical impact resistance, resilience and flexibility properties.

- **RTI Mech Str:** Mechanical Strength (Mechanical without Impact) RTI, associated with critical mechanical strength where impact resistance, resilience and flexibility are not essential.

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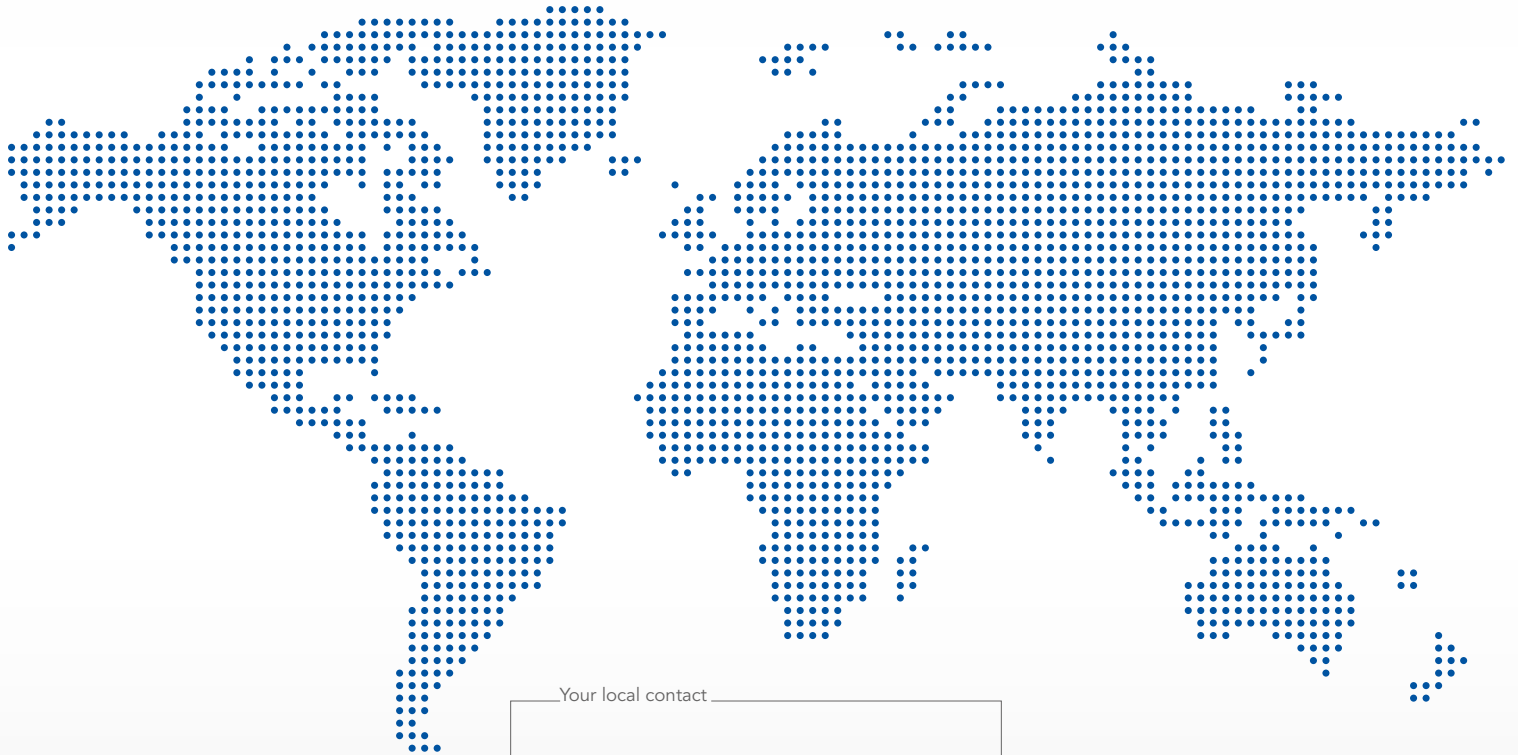
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## Notes

## Notes



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