
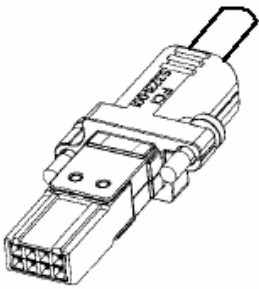
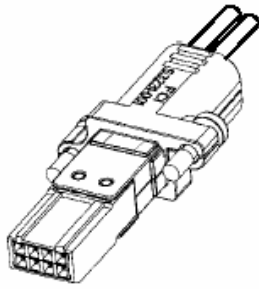


NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 1 of 105	REVISION G
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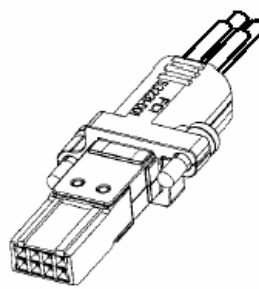
## SHIELDED CABLE CONNECTOR (RECEPTACLE)



**72861-x01LF, 53389-x01LF**

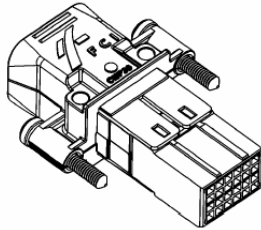


**72862-x01LF**

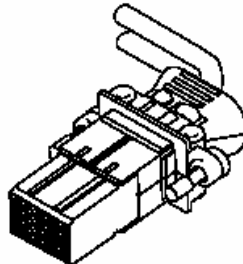


**10008166-x01LF**

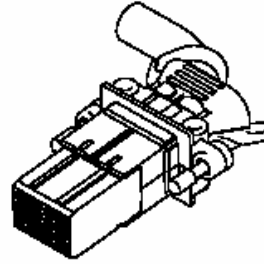
**2X4 SIGNAL**



**HM1C16D2J110EBLF**

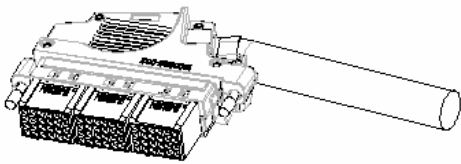


**72817-xyzLF**

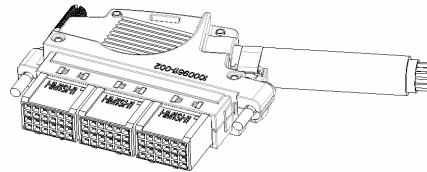


**72817-xyzLF**

**4X6 SIGNAL**

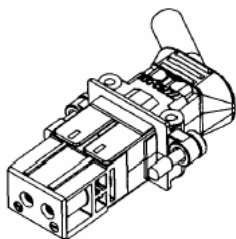


**10013881-x01L, 10013881-x31LF**  
(Non-shielded)

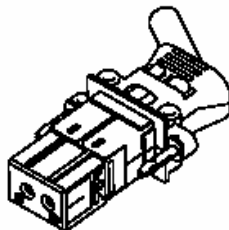


**10074494-x31LF**  
(Shielded)

**24 SIGNAL**




**72824-x01LF**



**72824-x02LF**


**POWER**

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 2 of 105	REVISION G
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# 1.PART A-2X4 SIGNAL

## 1.1 General

### 1.1.1 General information

The specification is valid for the Lead Free/RoHS compatible products

### 1.1.2 Ratings and characteristics


This document is describing a shielded metric cable connector for signal transmission. Basic grid is 0,5 mm, with contact springs at 2-mm grid. The minimum PCB spacing is 15 mm. The connector module consists of a contact unit and a die-casted metal cover.

#### 72861-x01LF (IDC)

Rated voltage	130V r.m.s sinus (contact/contact) min.
Current rating at 70°C	0,3A min.
Initial insulation resistance	5000 MΩ min.
Cable (round)	Total diameter Ø 7,0 mm max. 8 single wires. For AWG 24-26 max insulation thickness Ø 1,0 mm (nom. Ø8,0 mm). For AWG 28 max insulation thickness Ø 0,96 mm. For AWG 30 max insulation thickness Ø 0,8 mm. IDC-termination Ø 0,4 mm solid timplated conductor, AWG 26.

#### 72862-x01LF (SOLDER)

Rated voltage	130V r.m.s sinus (contact/contact) min.
Current rating at 70°C	0,3A min.
Initial insulation resistance	5000 MΩ min.
Cable (round)	Total diameter Ø 2,85 mm max. 2 single wires. For AWG 22or smaller with max. insulation thickness Ø 1,45 mm

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 8 of 105	REVISION G
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### 53389-x01LF (SOLDER)

Rated voltage	130V r.m.s sinus (contact/contact) min.
Current rating at 70°C	0,3A min.
Initial insulation resistance	5000 MΩ min.
Cable (double coax)	Total diameter Ø 2,85 mm max. 2 single wires. For AWG 22or smaller with max. insulation thickness Ø 1,45 mm

### 10008166-x01LF (SOLDER)


Rated voltage	130V r.m.s sinus (contact/contact) min.
Current rating at 70°C	0,3A min.
Initial insulation resistance	5000 MΩ min.
Cable (double coax)	Total diameter Ø 2,85 mm max. 4 single wires. For AWG 22or smaller with max. insulation thickness Ø 1,45 mm

### 1.1.3 Performance level

PERFORMANCE LEVEL	
XXXXX-1xxLF	<b>Telcordia CO</b>
XXXXX-XxxLF	<b>Customer Special</b>

## 1.2 Dimensions and material



NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
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## 1.2.1 Connector dimension

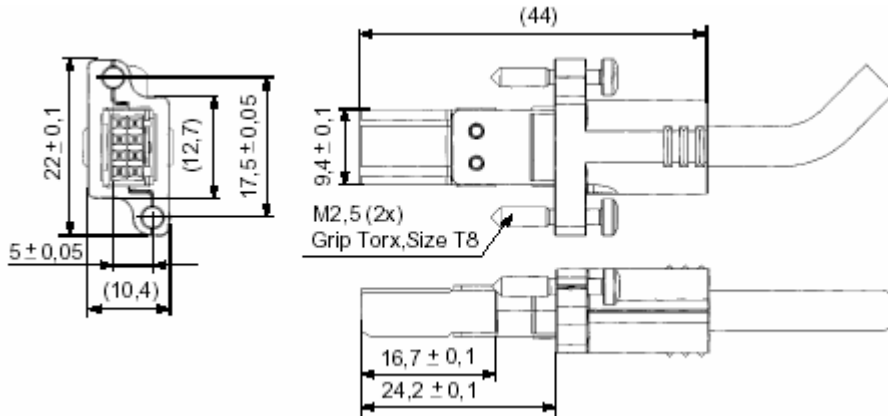


fig.1

### 1.2.1.1 Contact unit (1 terminal block + 8 terminals) 72861-x01LF

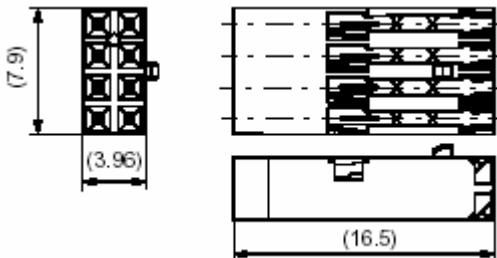


fig.2

### Contact unit (2 housings + 2 PCB + 8 terminals) 72862-x01LF

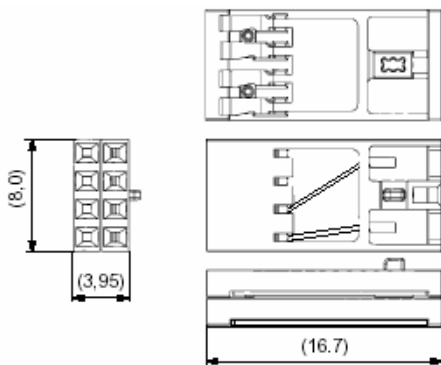



fig.3

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 10 of 105	REVISION G
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**Contact unit (2 housings + 2 PCB + 8 terminals) 53389-x01LF,10008166-x01LF**

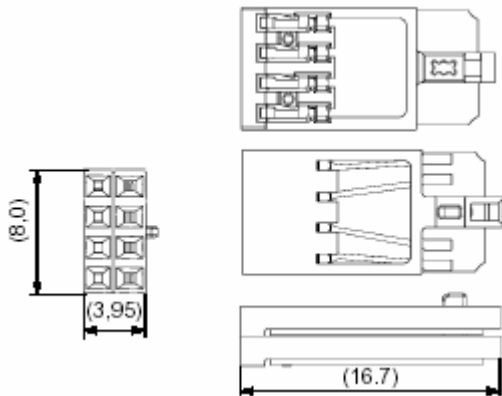


fig.4

**1.2.1.2 Shroud**

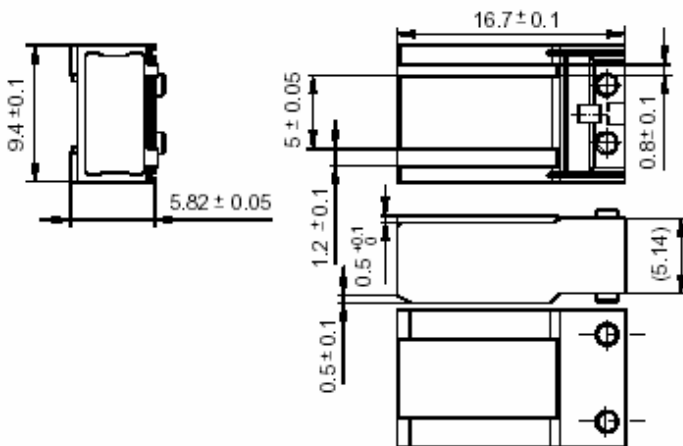


fig.5

**1.2.1.3 Inner ferrule**

Inner ferrule included in the kit.

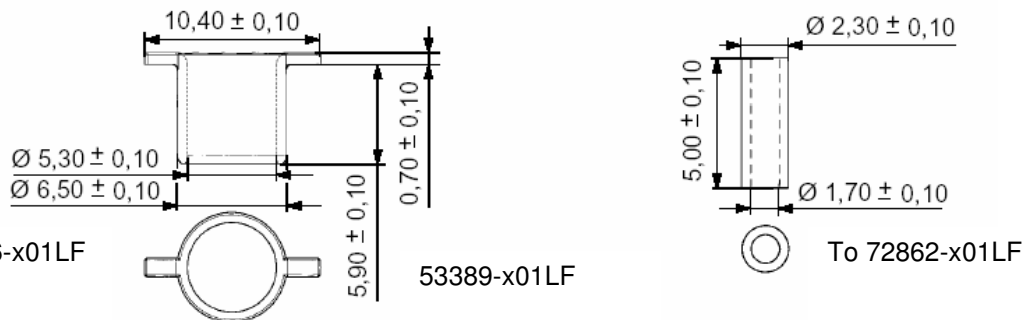



fig.6

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 11 of 105	REVISION G
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### 1.2.1.4 Outer ferrule for 72861-x01LF,10008166-x01LF,53389-x01LF

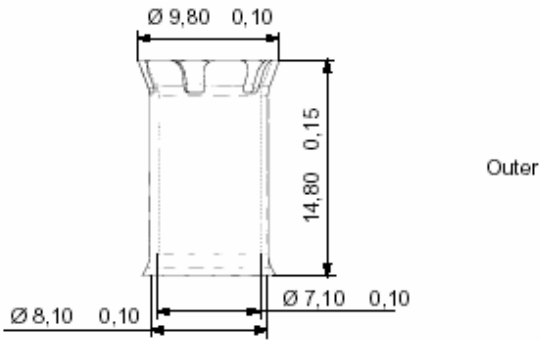


fig.7

### Outer ferrule for 72862-x01LF.

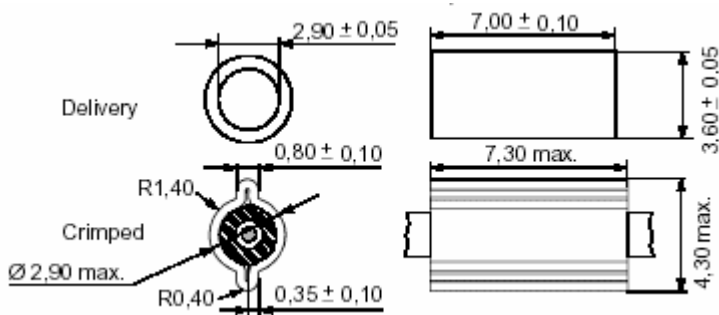


fig.8

### 1.2.1.5 Coax-holder dimensions for 72862-x01LF.

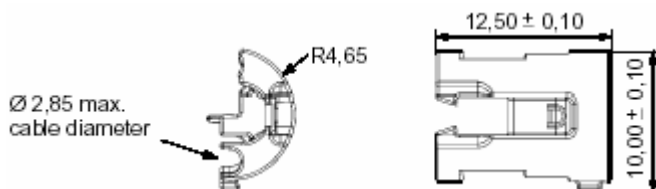



fig.9

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 12 of 105	REVISION G
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### 1.2.1.6 Cable holder for 10008166-x01LF

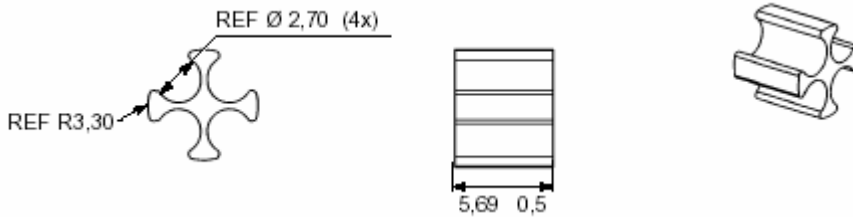


fig.10

### 1.2.2 Termination dimensions

#### IDC-slot dimensions regarding 72861-x01LF.

The copper conductor shall extend at least 0.75 mm beyond the IDC dimples, see

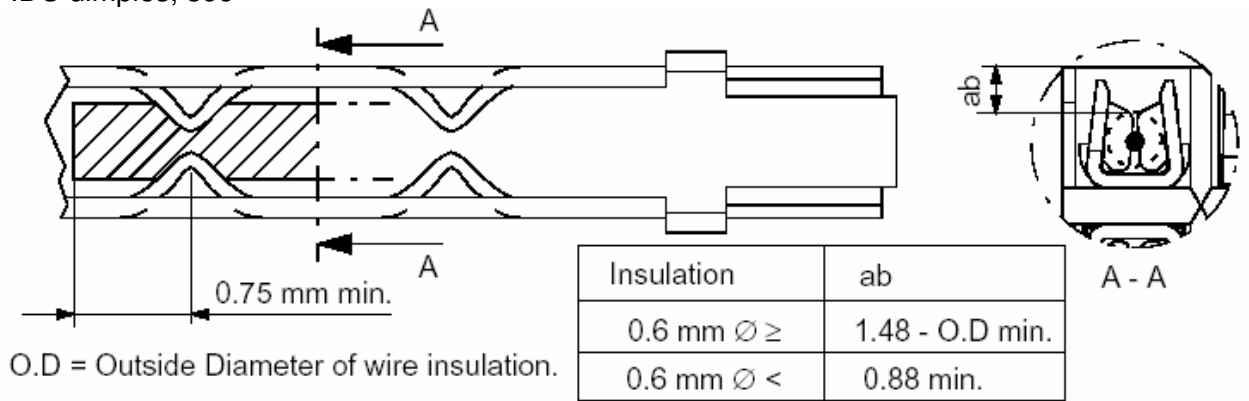



fig.11

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 13 of 105	REVISION G
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## 1.2.3 Material

### 1.2.3.1 Covers

Material: Zinc alloy  
Weight: 4,5 g/piece.

### 1.2.3.2 Contact element

#### 72861-x01LF

Material: Phosphor bronze  
Weight: 0,067 g/piece.

#### 72862-x01LF,53389-x01LF,10008166-x01LF

Material: Phosphor bronze  
Weight: 0,06 g/piece.

### 1.2.3.3 Terminal block

#### 72861-x01LF

Material: Polyamide 6.6 (30 % GF).  
Flammability class UL94V-0.  
Weight: 0,9 g/piece (fully loaded).

#### 72862-x01LF,53389-x01LF,10008166-x01LF


Material: LCP 30% GF for housing and FR4 for PCB.  
Flammability class UL94V-0. Weight: 0,24 g/piece.

### 1.2.3.4 Shroud

Material: Polyamide (30 % GF).  
Flammability class UL94V-0.  
Weight: 0,3 g/piece.

### 1.2.3.5 Screw

Material: Steel.  
Weight: 0,6 g/piece.

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TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 14 of 105	REVISION G
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### 1.2.3.6 Inner ferrule

#### **72861-x01LF,53389-x01LF,10008166-x01LF**

Material: Brass.  
Weight: 0,5 g/piece.

#### **72862-x01LF**

Material: Copper.  
Weight:0,08 g/piece.

### 1.2.3.7 Outer ferrule

#### **72861-x01LF, 53389-x01LF, 10008166-x01LF**

Material: Brass.  
Weight: 0,5 g/piece.

#### **72862-x01LF**

Material: Copper  
Weight: 0,22 g/piece.

### 1.2.3.8 Ferrule holder


#### **72862-x01LF**

Material: Zinc alloy.  
Weight ferrule holder half: 1,30 g/piece.

### 1.2.3.9 Clip

#### **72862-x01LF**

Material: Stainless Steel per DIN 17224.  
Weight: 0,23 g/piece.

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### 1.2.3.10 Cable holder

#### 10008166-x01LF

Material: Neoprene.  
Flammability class UL94V-0.  
Weight: 0,06 g/piece.

### 1.2.3.11 Total weight

Total weight of product 72861-x01LF is 13,4 g/piece.  
Total weight of product 72862-x01LF is 14,4 g/piece.  
Total weight of product 53389-x01LF is 14,34 g/piece.  
Total weight of product 10008166-x01LF is 14,4 g/piece.

### 1.2.4 Contact dimensions and surface coating

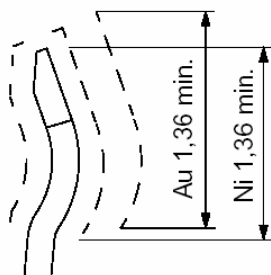
#### 1.2.4.1 Covers

All surfaces on covers tin-plated with Sn plating of 6µm min on the top, Ni plating of 2µm min as the next layer and Cu of 3µm at the bottom

#### 1.2.4.2 Contact surface

The contact surface is specified in figure 12. The specified values must be fulfilled at the whole specified area.

##### 1.2.4.2.1 Surface coating



Surface coating:

a) Hard gold .


b) Ni 1,27 µm min.

fig.12

##### 1.2.4.3 IDC-slot (applicable for 72861-x01LF)

fig.13

Ni 1,0 ±0,5 µm.  
Pure matte Sn 2 to 5 µm

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### 1.2.4.4 Inner ferrule

#### 72861-x01LF, 10008166-x01LF, 53389-x01LF

Min. 1 µm Ni, min. 6 µm Sn.

#### 72862-x01LF

Outside 8mm Sn min. over 1mm +3/-0 Ni sulfamate:  
Inside flash Sn min. over flash Ni sulfamate min.

### 1.2.4.5 Outer ferrule

#### 72862-x01LF

Outside 8mm Sn min. over 1mm +3/-0 Ni sulfamate:  
Inside flash Sn min. over flash Ni sulfamate min.

### 1.2.4.6 Ferrule holder

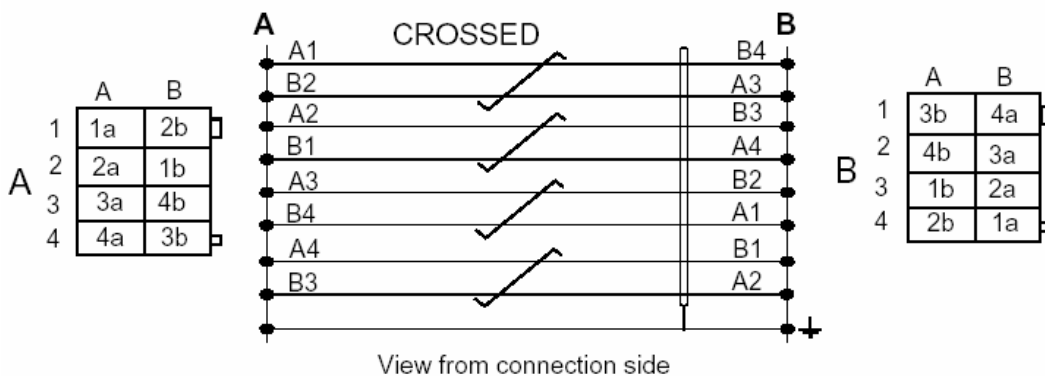
#### 72862-x01LF

All surfaces on tin-plated with Sn plating of 6 µm min on the top, Ni plating of 2µm min as the next layer and Cu of 3µm at the bottom.

## 1.2.5 Mounting information


### 1.2.5.1 Recommended termination

#### 1.2.5.1.1 on 72861-x01LF



See clause 1.6.3



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### 1.2.5.1.2 on 72862-x01LF

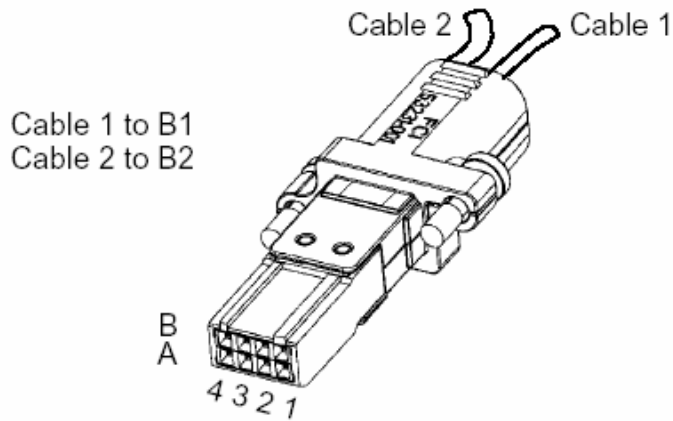


fig.14

### 1.2.5.1.3 on 53389-x01LF, 10008166-x01LF


No recommended termination.

### 1.2.5.2 Application tools

See document GS-20-050

See document GS-20-019

See document GS-20-030

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TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 18 of 105	REVISION G
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## 1.3 Characteristics

### 1.3.1 General

All characteristics refer to 2x4 Signal cable connectors and corresponding Board Connectors.(mated pair of connectors).

Approved cable for 72861-x01LF and quantity and distance of shrink tube /distance sleeve is:

Cable	Shrink tube or distance sleeve	Qty
4 pairs,24 AWG, conductor dia 0.5mm, outer dia 6.4±0.2mm	NO	"
4 pairs,24 AWG, conductor dia 0.5mm, outer dia 6.7±0.3mm	NO	"
4 pairs,26 AWG, conductor dia 0.4mm, outer dia 6.5±0.3mm	NO	"
4 pairs,26 AWG, conductor dia 0.4mm, outer dia 5.5±0.5mm	YES	5 mm
4 pairs,26 AWG, conductor dia 0.4mm, outer dia 5.0±0.8mm		
4 pairs,26 AWG, conductor dia 0.4mm, max outer dia =5.0mm	YES	1
4 pairs,26 AWG, conductor dia 0.5mm, max outer dia =5.7mm		
2x2 pairs,26 AWG, conductor dia 0.4mm,norm.dia of overall sheath=4.7x7.1mm	YES	10 mm
4x2 pairs,26 AWG, conductor dia 0.4mm,norm.dia of overall sheath=6.5 mm	YES	10 mm
4 pairs,26 AWG, conductor dia 0.4mm, outer dia 6.3±0.7mm	YES	10 mm
2 Nos ,4 pairs,26 AWG, conductor dia 0.4mm, outer dia 5.0±0.8mm	NO	"
2 Nos ,4 pairs,26 AWG, conductor dia 0.4mm, outer dia 5.0mm	NO	"
2 Nos ,4 pairs,26 AWG, conductor dia 0.4mm, outer dia 5.7mm	YES	25 mm
2 pairs,26 AWG, conductor dia 0.4mm, max outer dia =4.5mm	YES	2x25 mm
4 pairs,26 AWG, conductor dia 0.5mm, outer dia 5.1±0.5mm	YES	10 mm
4 pairs,24 AWG, conductor dia 0.4mm, outer dia 6.0±0.3mm	YES	10 mm
4 pairs,26 AWG, conductor dia 0.4mm, outer dia 5.7±0.3mm	YES	10 mm
2 Nos ,28 AWG, conductor dia 0.31±0.005mm, outer dia 2.75±0.10mm	NO	"
4 Nos ,28 AWG, conductor dia 0.31±0.005mm, outer dia 2.75±0.10mm	YES	1
4 conductor 28AWG, conductor dia 0.31±0.005mm, outer dia 8.2±0.30mm	YES	1
4 conductor 28AWG, conductor dia 0.31±0.005mm, outer dia 2.75±0.10mm	NO	20mm
		"

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Approved cable for 72862-x01LF is a) 28 AWG, conductor 0.31±.005 mm, Outer dia=2.75±0.10mm, b) 2 conductors, 28 AWG, conductor dia0.31±.005mm, Outer dia=2.75±0.10mm.

Approved cable for 53389-x01LF is a)28 AWG, conductor 0.31±.005 mm, Outer dia=2.75±0.10mm,b) 2 conductors,28 AWG, conductor dia0.31±.005mm, Outer dia=2.75±0.10mm.

Approved cable for 10008166-x01LF is a) 28 AWG, conductor 0.31±. 005 mm, Outer dia=2.75±0.10mm,b) 4 conductors, 28AWG, conductor 0.31±. 005mm,Outer dia=8.2±0.30mm

### 1.3.2 Reference environment

According to IEC 68-1 clause 5.3.1.

**Table 1:**

Temperature	15°C-35°C
Rel.humidity	25%-75%
Atmospheric pressure	86-106kPa

### 1.3.3 Climate category

**Table 2:**

Storage	Max. temperature	50°C
	Min. temperature	-40°C
Range of uses	Max. temperature	70°C
	Min. temperature	-40°C

### 1.3.4 Electrical

#### 1.3.4.1 Creepage and clearance distances

Minimum creepage and clearance distance between contacts is 0,4 mm and between contacts and ground is 0,4 mm.


#### 1.3.4.2 Voltage proof

Initial voltage proof 1000 V r.m.s sinus min.

Voltage proof 1000 V r.m.s sinus min. after damp heat steady state test.

Conditions:

ETX 1056-104 clause 4.3.2.

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### 1.3.4.3 Current carrying capacity

Current carrying capacity 0,3	Ambient temperature 70°C
----------------------------------	-----------------------------

Maximum increase in temperature 10°C at 0,3A, in all contacts.  
Conditions: ETX 1056-104 clause 4.4.1.  
Arrangement according to fig. 16 in clause 4.2.

### 1.3.4.4 Contact resistance


Initial contact resistance according to table 3.  
Contact resistance max increase 10 m after heat ageing.  
Conditions: ETX 1056-104, clause 4.2.1.  
Arrangement according to figure 17 in clause 4.3

**Table 3:**

Arrangement	Row	Resistance
Contact/contact	a	25mΩ max
Contact/contact	b	35mΩ max

### 1.3.4.5 Insulation resistance

Initial insulation resistance 5000 MΩ minimum. Insulation resistance  
1000 MΩ minimum, after damp heat steady state test.  
Conditions: ETX 1056-104 clause 4.3.1.

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### 1.3.4.6 Termination resistance

Contact resistance max increase 1mΩ after step 6 (heat ageing) in test procedure (compared to initial values). Max increase between step 7 and fully performed test procedure is 1mΩ (compared to values after step 6).

Conditions: ETX 1056-104 clause 4.2.1.

Arrangement according to figure 17 clause 4.4.

Connector terminated with cables -4 pairs,26 AWG, conductor dia 0.4mm,Outer dia 5.5±0.05mm

1. Pulling test according to fig. 19.Applied force 50 N for 10 sec.,2 cycles.  
2. Bending test according to fig. 20,10 cycles. One cycle is: Applied force 5 N along the cable-axis where it fits into the covers, a 90° bend upwards, a 90° bend downwards and then back to normal position.

3. Twisting test according to fig. 22, 5 cycles. The first cycle is: Applied force 5 N along the cable-axis where it fits into the covers, a 90° bend downwards (start position), a 180° twist clockwise then back 180° counter clockwise to start position, twist 180° counter clockwise and back to start position. The second cycle starts with a 90° bend of cable in the opposite direction compared to the first cycle, then the same procedure as the first cycle.  
During the test, a tensile load of 5 N shall be applied to the cable.

4. Change of temperature: Rapid change of temperature according to IEC 68-2-14 test Na, -55°C, +85°C, 3h, 100 cycles.


5. Heat ageing 56 days in 85°C according to IEC 68-2-2 test Bb.

6. Damp heat: Damp heat steady test according to IEC 68-2-3, 40°C, 90-95% rel. humidity in 56 days.

7. Corrosion 21 days according to IEC 60068-2-60, test Ke, method 2: 200 ppb NO<sub>2</sub>, 10 ppb H<sub>2</sub>S, 10 ppb Cl<sub>2</sub>, 30°C, 70% R.H., film on Cu 0,3-1,0 mg/m<sup>2</sup>,d.

### 1.3.4.7 Transfer impedance - EMC

Zt max. 50 mΩ from 0,3 MHz to 100 MHz (harnesses).

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### 1.3.4.8 Signal transmission

Maximum reflections resulting from the female-male (2x4 signal) connector pair are less than 3% at 3ns rise time.

Worst case cross talk for one connector pair and four periodic differential signals at 3 ns rise time:

NEXT: 3% (-30dB) cross-mounted, 6% (-24dB) vertically mounted.

FEXT: 1% (-40dB) cross-mounted, 1% (-40dB) vertically mounted.

### 1.3.5 Mechanical

#### 1.3.5.1 Mechanical operations

Number of operations: 200 minimum.

Conditions: IEC 512-5, test 9a.

Standard atmospheric conditions.

Frequency of operations: 100 cycles/h.

Speed of operation: 10mm/s maximum.

Rest: 30s unmated.

#### 1.3.5.2 Insertion and withdrawal forces

Total insertion force:  $n \times 1,1$  N max. (n=number of contacts involved)

Individual withdrawal force: 0,15 min.

#### 1.3.5.3 Contact retention in insert

Force to be applied: 5 N.

Conditions: IEC 512-8 test 15a.

Standard atmospheric conditions.

The maximum axial displacement after the force has been removed shall not exceed 0,1 mm.

Min. 10 readings per connector.

Fully equipped connectors.

#### 1.3.5.4 Contact force

##### 1.3.5.4.1 Contact spring force

Initial contact spring force 0,5N min.

Contact spring force 0,5N min., after 200 mechanical operations.


Contact spring force 0,4N min., after heat ageing, end of life.

Recommended: Initial contact spring force 1,1-1,4N.

Contact spring force 1,1-1,4N, after 200 mechanical operations.

Contact spring force 1,0-1,3N, after heat ageing.

Conditions: ETX 1056-104 clause 4.6.2.

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#### 1.3.5.4.2 Contact force, off centre

Initial contact force, off centre 0,5N.

Contact force, off centre 0,5N min., after 200 mechanical operations.

Contact force, off centre 0,3N min., after heat ageing.

Recommended: Initial contact force, off centre 0,7-1,3N min.

Contact force, off centre 0,7-1,1N, after 200 mechanical operations.

Contact force, off centre 0,7-1,1N, after heat ageing.

Conditions: ETX 1056-104 clause 4.6.3.

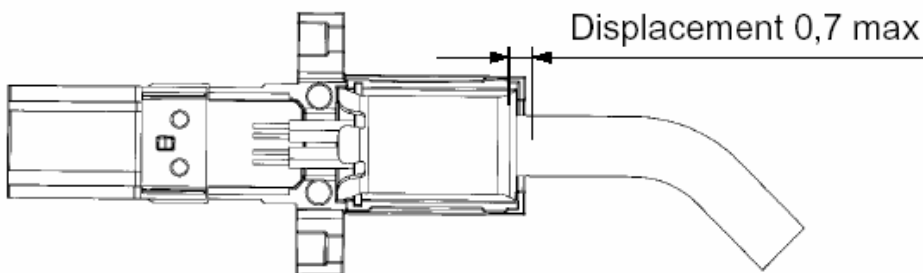
#### 1.3.5.5 Misaligned mating

The connector shall withstand a misaligned mating with Signal Board connector of  $\pm 2^\circ$  according to fig 19 in clause 1.4.5, without negative effect on the contacts. Verifying will be done by a design analysis.

#### 1.3.6 Product safety


Requirements according to IEC 60 950, UL 1950.

#### 1.3.7 Strain relief



**72861-x01LF shown**

fig.15

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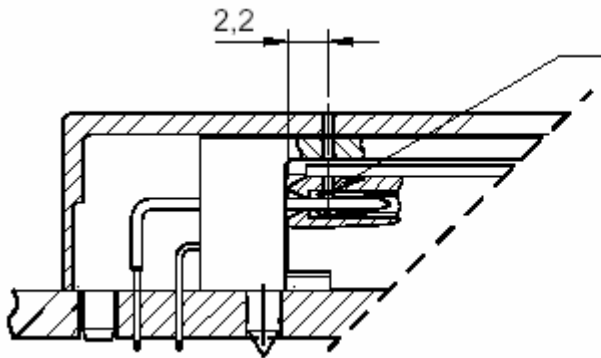
## 1.4 Testing

### 1.4.1 General

The connector shall undergo the testing schedule described in ETX 1056-104LF. This is a type testing and an approval will be the result. The manufacturing process and/or the vendors internal specification may not be changed after type testing and approval without permission from design responsible.

### 1.4.2 Current carrying capacity

For conditions see clause 1.3.4.3.



Measurement of temperature as close as possible to contact point position without affecting the contact force.

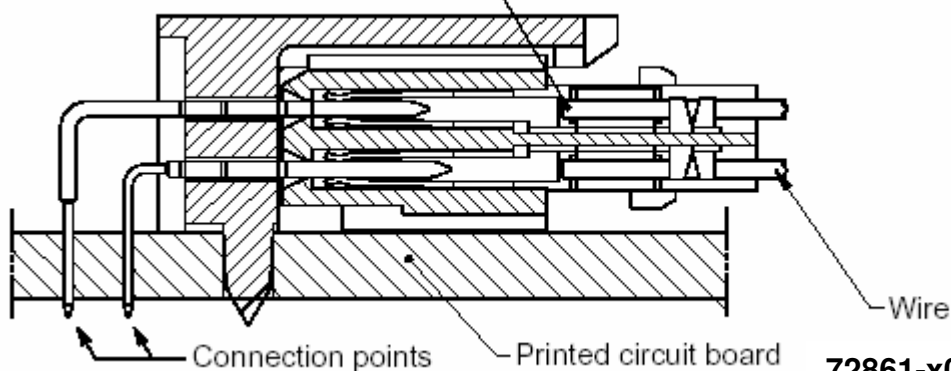
**72861-x01LF shown**

fig.16

### 1.4.3 Contact resistance

#### 1.4.3.1 Contact resistance


For conditions see clause 1.3.4.4.  
Connection point (in both rows).



**72861-x01LF shown**

fig.17



NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 25 of 105	REVISION G
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### 1.4.3.2 Transfer impedance

Bulk Current Injection method.  
According to document number ETX/U/ME 97-072 .

### 1.4.4 Termination resistance

For conditions see clause 1.3.4.6.

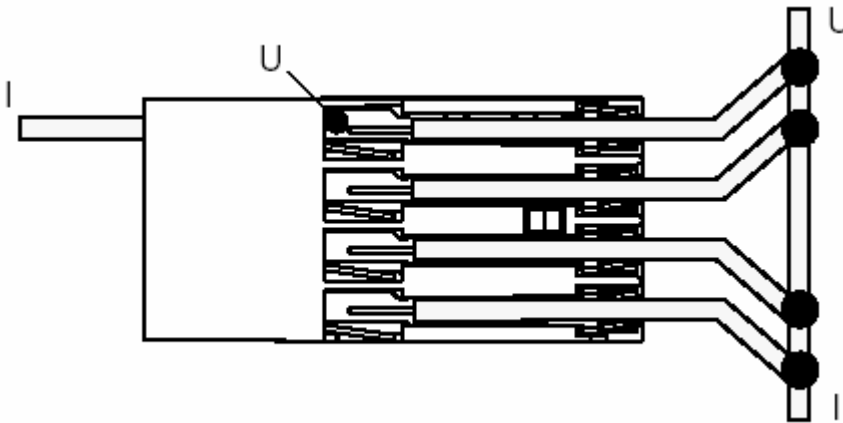


fig.18

### 1.4.5 Misaligned mating

For conditions see clause 1.3.5.5.

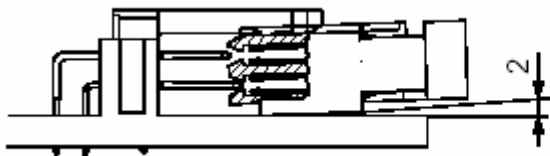



fig.19

**72861-x01LF shown**

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### 1.4.6 Pull, bend and twist test of the cable

Conditions: ETX 1056-104LF clause 5.2.3.

During the pull-bend- and twist tests, the IDC-connector shall be mounted in housings with connected cable as specified.

Pull test:

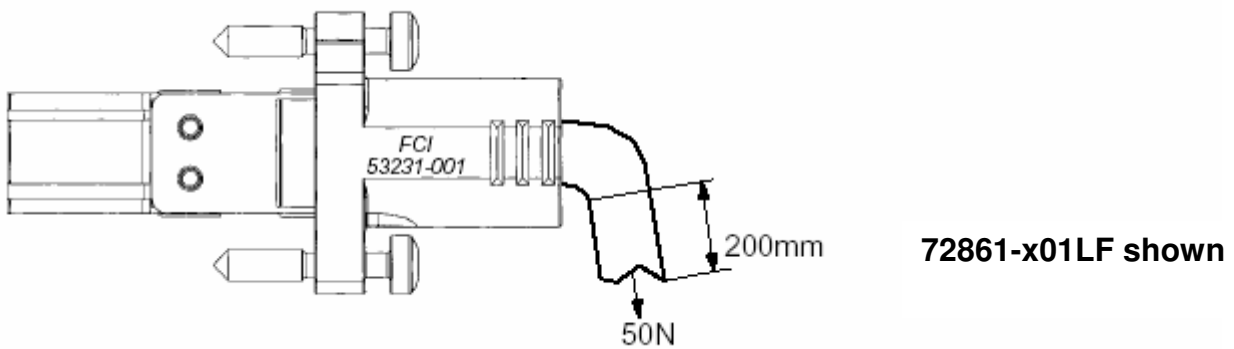


fig.20

Bend test:

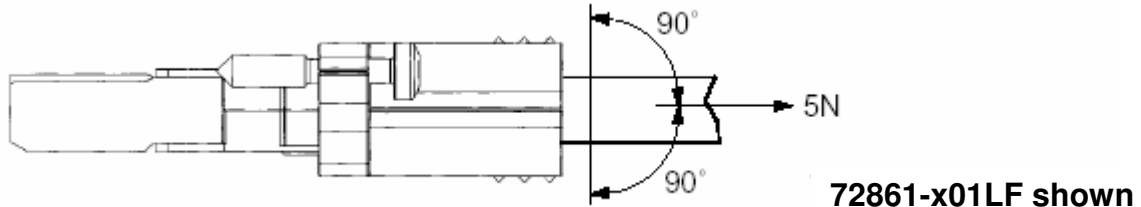


fig.21

Twist test:

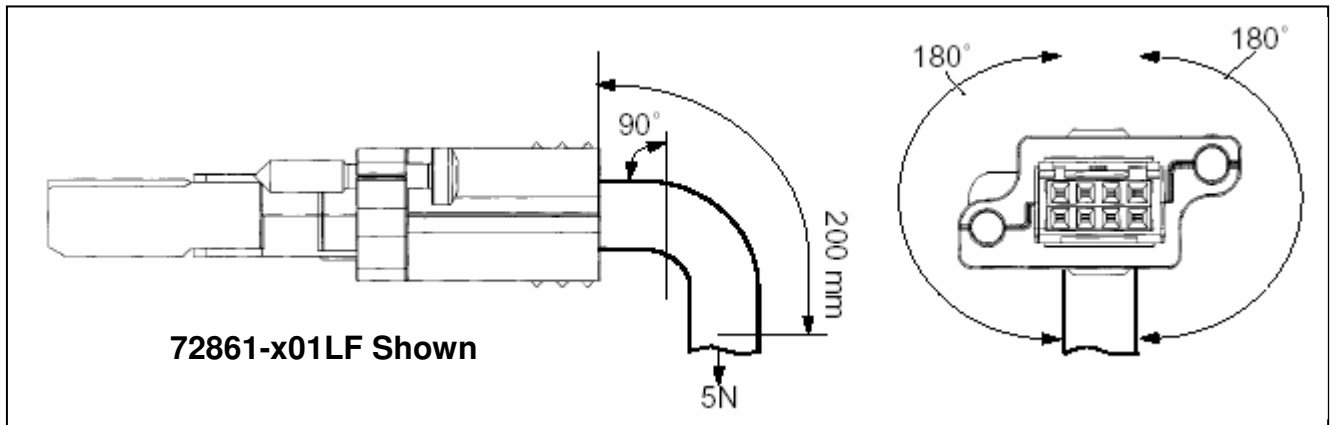



Fig 22

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 27 of 105	REVISION G
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## 1.5 Packing

### 1.5.1 Packing for transport

If the connector consists of two or more pieces, it shall be possible to use kit packing. Packing shall be made so that:

- a no damage or deformation of the terminals will occur
- b no particles or parts from the packing will enter into the contacts cavities and no gases or acids from packing materials will harm the housing or the contact elements
- c the connectors can be removed without problems from the packing without touching the terminals or deforming them

The packing shall be marked with product number, manufacturer code and packing date.

Kit packaging.

Under consideration.

Kit ordering must be available.

For packaging details refer EUR-14-008.

## 1.6 Product number

### 1.6.1 Contact arrangement

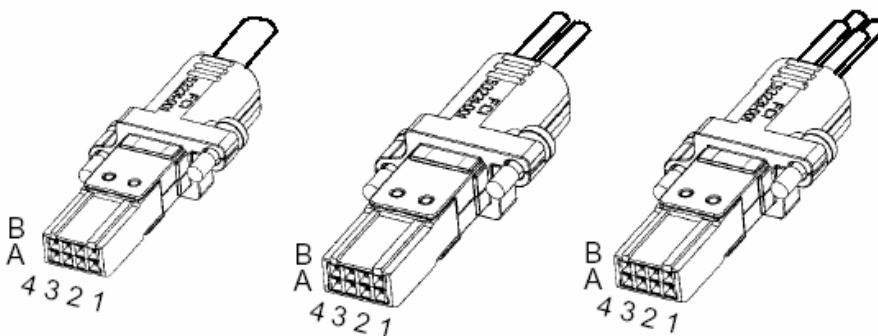
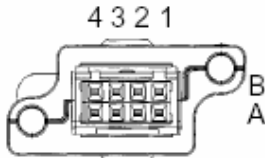



fig.23

Table 4:

	Part no	Terminals	Used positions
	72861-x01LF (signal)	8	Fully
	72862-x01LF (coax)	4	B1,B2
	72864-x01LF (coax)	8	A1-A4,B1-B4
	10008166-x01LF (coax)	8	A1-A4,B1-B4

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TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 28 of 105	REVISION G
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## 1.6.2 Product identification

Covers:

Marked with product number and FCI letters.

Shroud:

Marked with product number.

IDC Terminal block:

Marked with product number, batch number and factory code.

## 1.6.3 Specification key

### 1.6.3.1 72861-x01LF

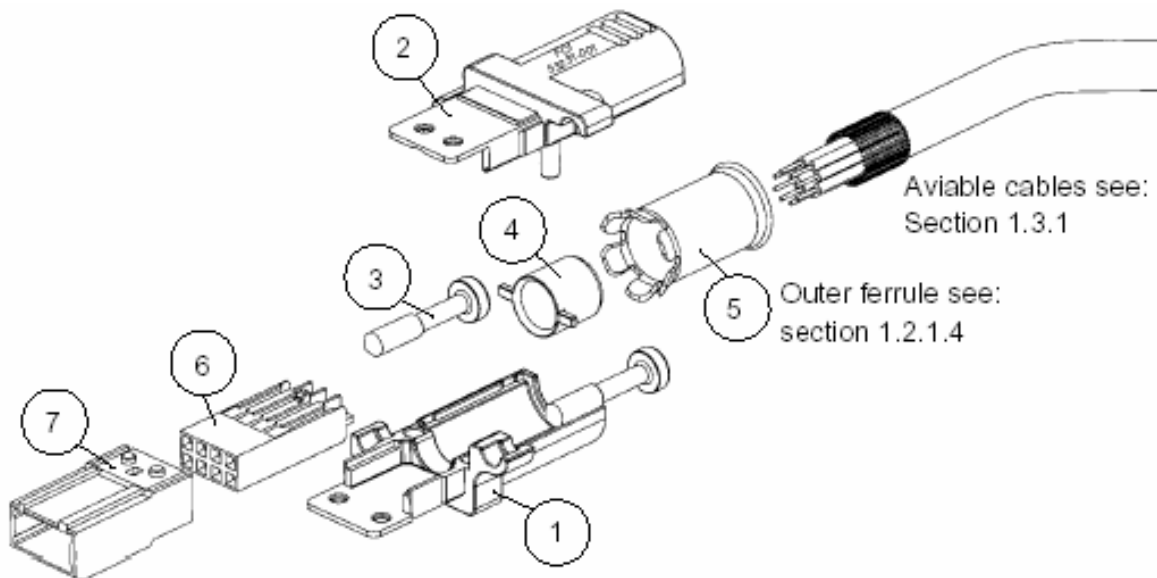



fig.24

**Table 5:**

Pos.	Product name	Product number	72861-x01LF
1	Cover-half	53230-001LF	1
2	Cover-half	53231-001LF	1
3	Screw	72780-001LF	2
4	Inner ferrule	53235-001LF	1
5	Outer ferrule	See section 1.2.1.4	1
6	Terminal block	85709-001LF	1
7	Shroud	85710-001LF	1
8	Available cable	See section 1.3.1	

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 29 of 105	REVISION G
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### 1.6.3.2 72862-x01LF

#### Specification key 72862-x01LF

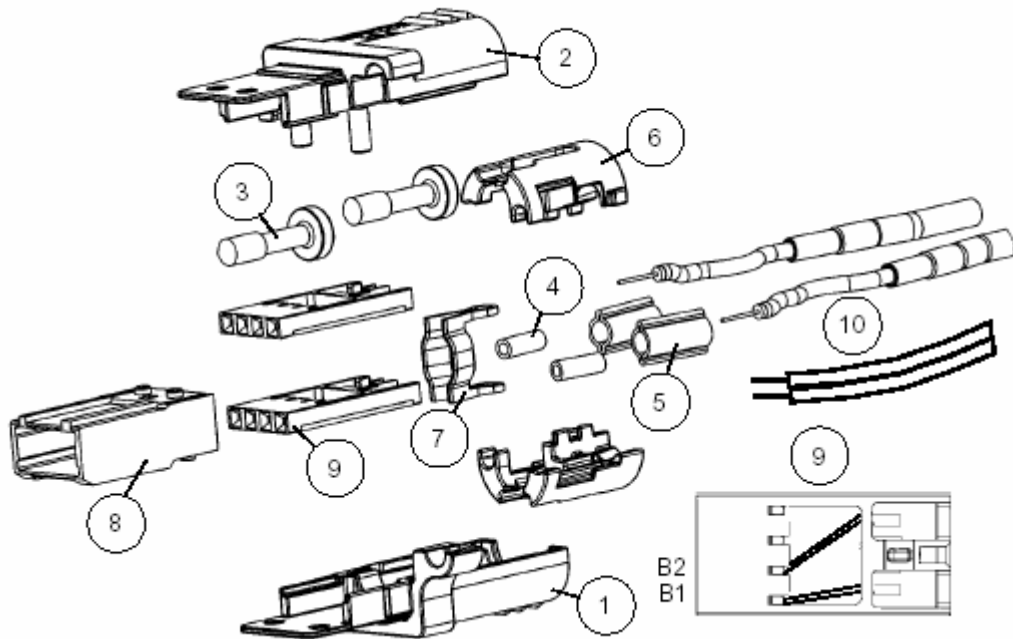



fig.25

**Table 6:**

Pos.	Product name	Product number	72861-x01LF
1	Cover-half	53230-001LF	1
2	Cover-half	53231-001LF	1
3	Screw	72780-001LF	2
4	Inner ferrule	70022-002LF	2
5	Outer ferrule	70023-002LF	2
6	Ferrule older	70024-001LF	2
7	Clip	HM1C09P21	1
8	Shroud	85710-001LF	1
9	Wafer	70026-001	2
10	Available cable	See section 1.3.1	

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 30 of 105	REVISION G
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### 1.6.3.3 53389-x01LF

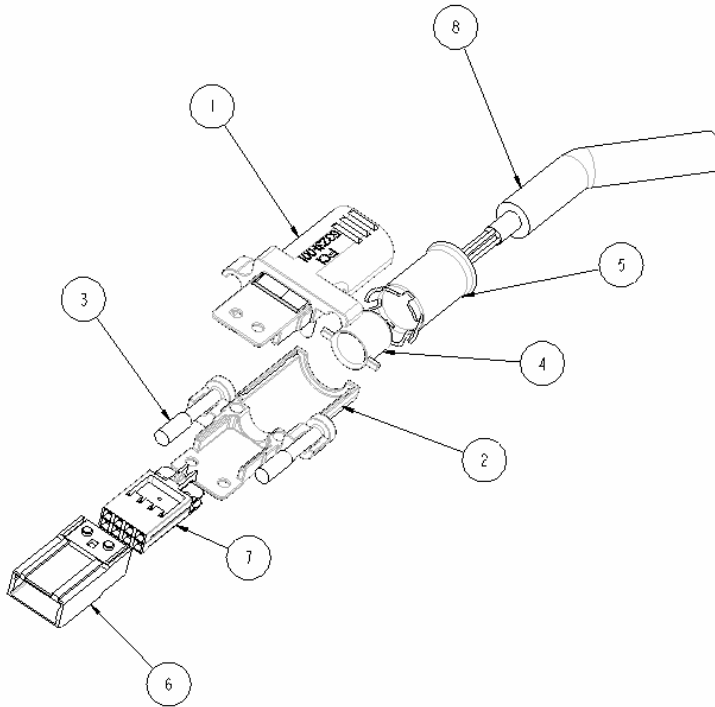



fig.26

**Table 7:**

pos	Product name	Product number	53389-x01LF
1	Cover-half	53231-001LF	1
2	Cover-half	35231-001LF	1
3	Screw	72780-001LF	2
4	Ferrule Inner	53235-001LF	1
5	Ferrule outer	53236-001LF	1
6	shroud	85710-001LF	1
7	wafer	53238-001LF	2
8	See cable	See section 1.3.1	

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 31 of 105	REVISION G
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### 1.6.3.4 10008166-x01LF

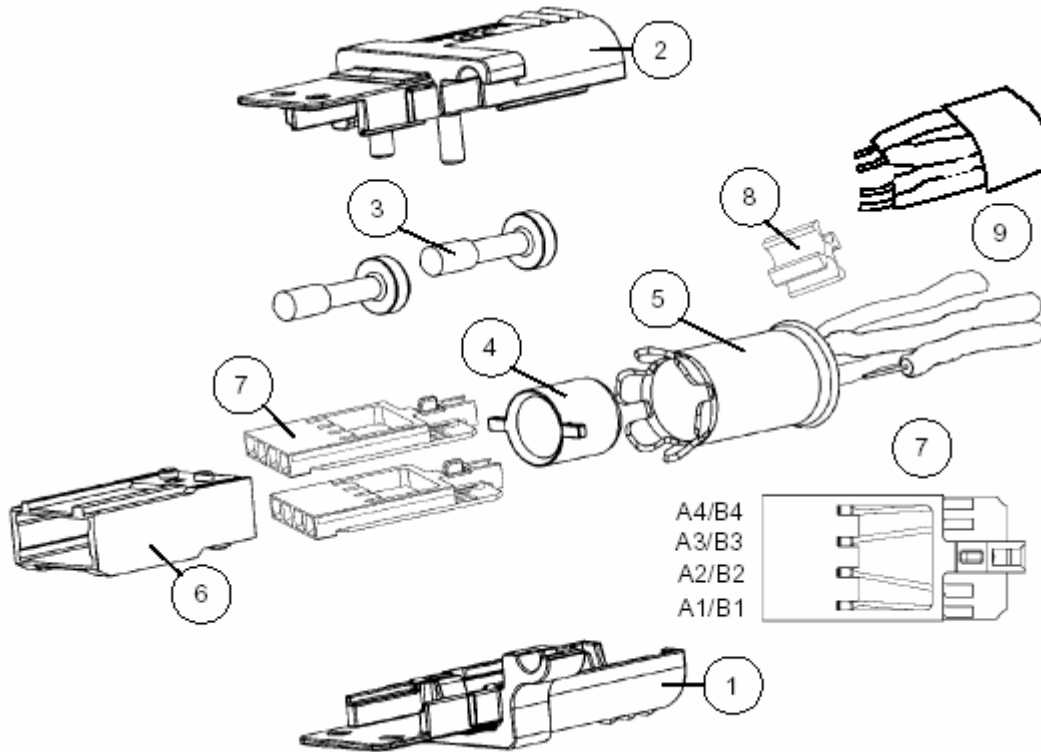



fig.27

**Table 8:**


Pos	Product name	Product number	10008166-x01LF
1	Cover-half	53230-001LF	1
2	Cover-half	53231-001LF	1
3	Screw	72780-001LF	2
4	Inner ferrule	53235-001LF	1
5	Outer ferrule	See section 1301-RNY 104 38	1
6	shroud	85710-001LF	1
7	Wafer	85710-002LF	2
8	Sleeve	10008165-001LF	1
9	Available cables	Sees section 1.3.1	

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 32 of 105	REVISION G
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## 1.7 References

IEC 68-1	Environmental testing, Part 1: General and guidance.
IEC 68-2	Environmental testing, Part 2:Tests.
IEC 512	Electromechanical components for electronic equipment; basic testing procedures and measuring methods.
IEC 60068-2-60	Flowing mixed gas corrosion test: Test Ke.
ETX 1056-104	Type testing program and demands for electrical connectors.
GS-12-037	Product specification.  Generic Product specification of 4X6 Signal
UL 1950	Standard for safety of information technology equipment, 3rd edition.
IEC 609 50	Safety of information technology equipment.
ETX/U/ME 97:072	



NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 33 of 105	REVISION G
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## 2.PART Ba (4 X 6 SIGNAL) IDC CABLE CONNECTOR

### 2.1 General

#### 2.1.1 General information

The specification is valid for the Lead Free/RoHS compatible products

#### 2.1.2 Ratings and characteristics

This document is describing a shielded insulation displacement connector (IDC) for signal transmission. It is intended for discrete wire cable. Basic grid is 0,5 mm. The minimum PCB spacing is 20 mm. The 2.0mm pitch connector has 4 rows with 6 individual contact springs per row and is intended to mate with PCB mounted male connector. (72844,72858).

Rated voltage	130V r.m.s sinus (contact/contact) min.
Current rating at 70°C	0.3A min.
Initial insulation resistance	5000MΩ min.
Cable (round)	Total diameter Ø8.2 mm max. Max 24 single wires. For AWG 24-26 max insulation thickness Ø 1,0 mm (nom. Ø 0,80 mm For AWG 28 max insulation Thickness Ø 0,96 mm For AWG 30 max insulation Thickness Ø 0,80 mm
HM1C16D2J110EBLF	Ø 0,4 mm solid tinplated conductor AWG26
HM1C16D0J110EBLF	Ø 0,25 mm solid silver plated conductor AWG30

The connector module consists of a contact unit and a die-caste metal cover with a built-in metal cable strain relief.

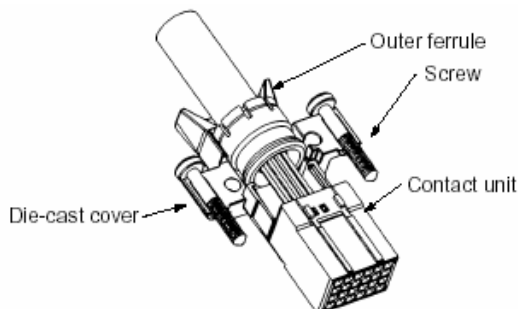



fig.1

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 34 of 105	REVISION G
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### 2.1.3 Performance level

PERFORMANCE LEVEL	
XXXXX-1xxLF	<b>Standard Product</b>
XXXXX-XxxLF	<b>Customer Special</b>

## 2.2 Dimensions and material

### 2.2.1 Connector dimensions

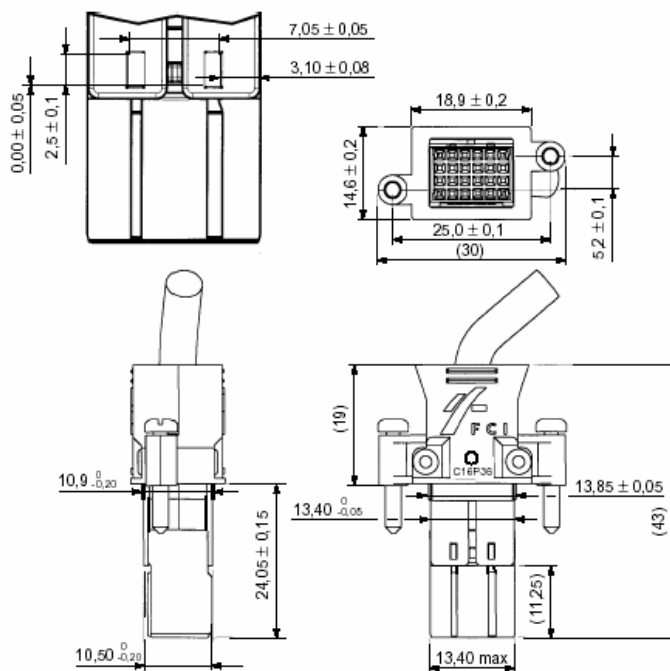


fig.2

#### 2.2.1.1 Screw and rivet

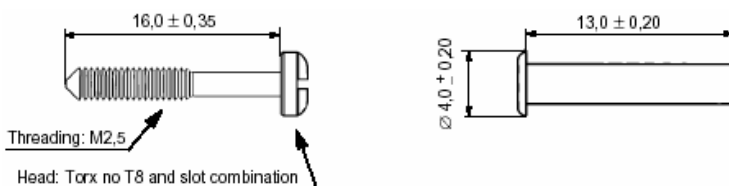



fig.3

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 35 of 105	REVISION G
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### 2.2.1.2 Cable ferrules

Outer ferrule included in kit HM1C16D0J110EBLF and HMIC16D2J110EBLF.

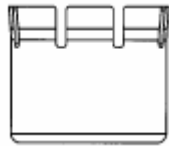


fig.4

### 2.2.1.3 Inner ferrule

Different inner ferrules for different cables see customer drawing for HM1C16D\_J110EBLF, BSA202877001.

### 2.2.1.4 Contact unit

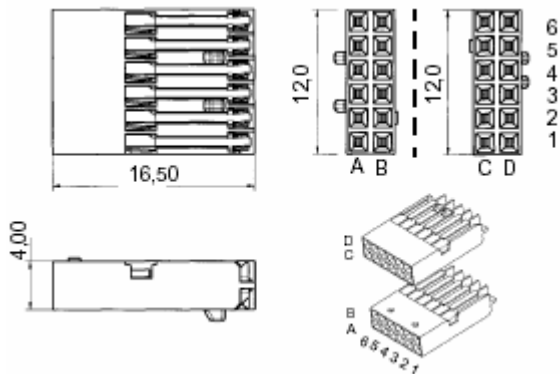


fig.5

### 2.2.1.5 IDC-slot dimensions

The copper conductor shall extend at least 0.75 mm beyond the IDC dimples see fig.6

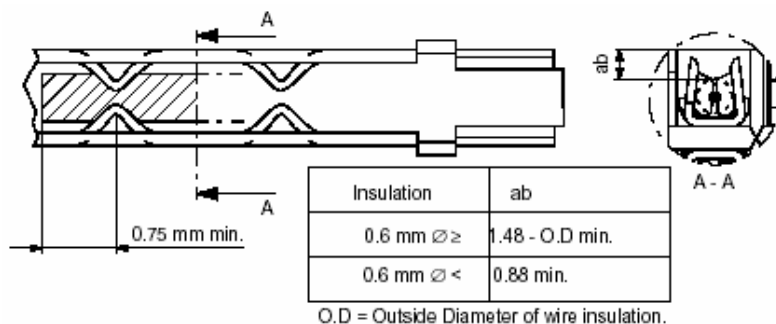



fig.6

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HMLC16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 36 of 105	REVISION G
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### 2.2.1.6 Shroud

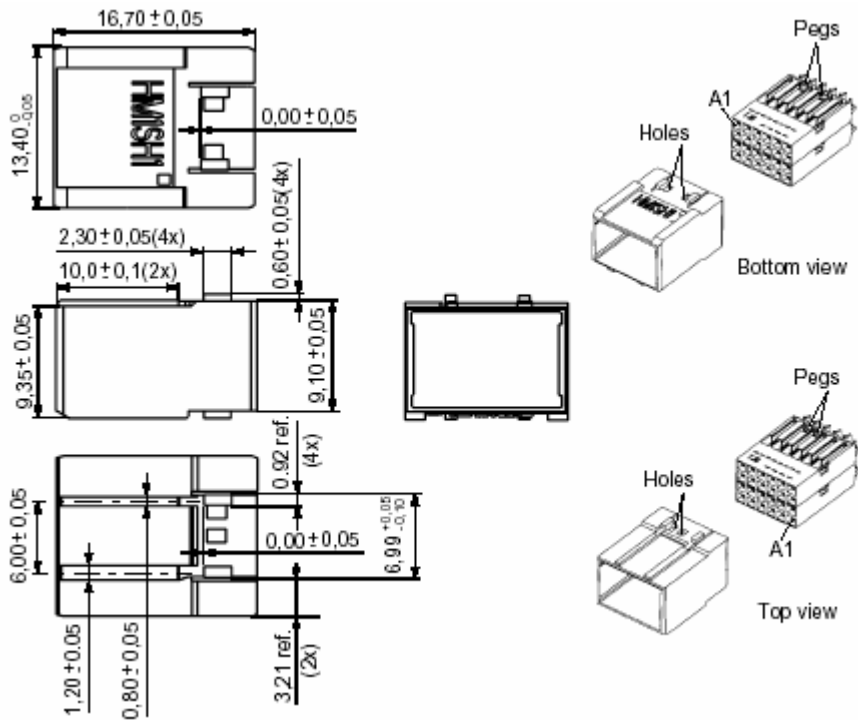


fig.7

### 2.2.1.7 Covers

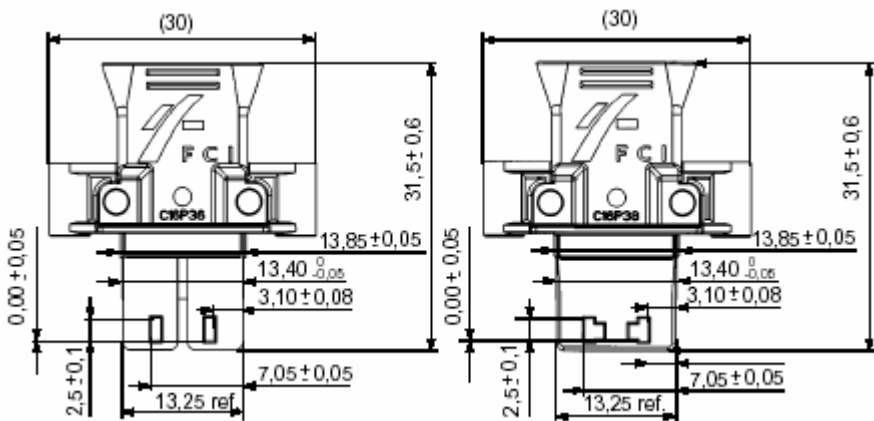



fig.8

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 37 of 105	REVISION G
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## 2.2.2 Material

### 2.2.2.1 Contact unit

#### 2.2.2.1.1 Shroud and terminal block

Terminal block material: Polyester (PBTP), 30% glass-filled.  
Shroud material: Polyamide, 30% glass-filled.  
Total weight: 3.25 g/piece.

#### 2.2.2.1.2 Contact elements

Material: Phosphor bronze.  
Plating See clause 2.2.4.1.  
Weight: 0,067 g/piece.

#### 2.2.2.2 Die-cast cover

##### 2.2.2.2.1 Metal part

Material: Zinc alloy .  
Plating: min. 6 µm Sn over min. 2 µm Ni over min.3 µm Cu.  
Weight: 7,98 g/piece.

##### 2.2.2.2.2 Rivet


Material: Brass.  
Plating 2-3 µm Sn.  
Weight: 0,24 g/piece.

##### 2.2.2.2.3 Screw

Material: Steel.  
Plating: 4-7 µm Ni (electroplated).  
Weight: 0,64 g/piece.

##### 2.2.2.2.4 Ferrules

Outer ferrule.  
Material: Copper.  
Plating: 8 µm Sn over 1 µm Ni.  
Weight: 1,66 g/piece.  
Inner ferrule.  
See customer drawing for HM1C16D\_J110EBLF, BSA202877001.

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TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 38 of 105	REVISION G
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## 2.2.3 Vital safety requirements

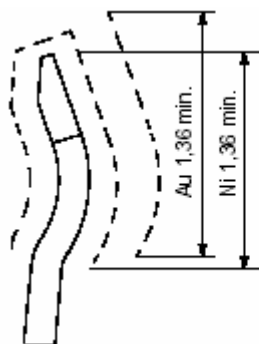
According to IEC 60950 and UL 1950  
unless otherwise stated.

## 2.2.4 Surface coating, contact element

### 2.2.4.1 Contact surface

The contact surface is specified in fig.9. The specified values must  
be fulfilled at the whole specified area.

#### 2.2.4.1.1 Contact coating mating area



Surface coating:

a) Hard gold

b) Ni 1,27  $\mu\text{m}$  min.

fig.9

#### 2.2.4.1.2 Coating termination area

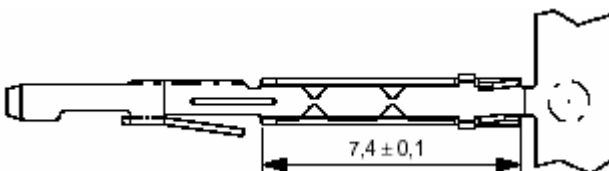



fig.10

Ni 1,0  $\pm$  0,5  $\mu\text{m}$ .  
Pure matte Sn 2 to 5  $\mu\text{m}$

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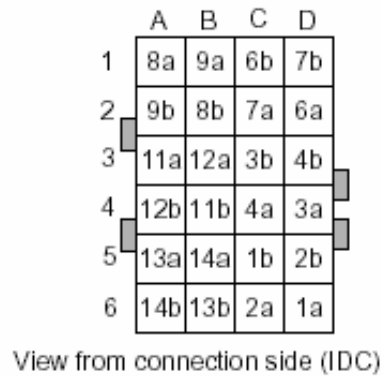
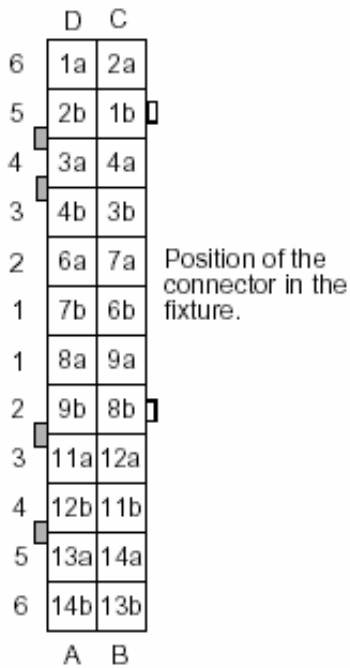
## 2.2.5 Mounting information


### 2.2.5.1 Application tools

See Document GS-20-050

### 2.2.6 Recommended termination

Crossed termination recommended.



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## 2.3 Characteristics

### 2.3.1 General

All characteristics refer to HM1C16D\_J110xxLF in combination with 72844LF and 72858LF (mated pair of connectors).

Approved cables see spec. see the customer drawing for HM1C16D\_J110EBLF, BSA202877001LF.

### 2.3.2 Reference environment

According to IEC 68-1 clause 5.3.1.

**Table 1:**

Temperature	15 °-35 °C
Rel.humidity	25%-75%
Atmospheric pressure	86-106kPa

**Table 2:**

storage	Max. temperature	50 °C
	Min. temperature	-40 °C
Range of uses	Max. temperature	70 °C
	Min. temperature	-40 °C

### 2.3.3 Climate category

### 2.3.4 Electrical


#### 2.3.4.1 Creepage and clearance distances

Minimum creepage and clearance distance between contacts is 0,4 mm and between contacts and ground is 0,4 mm.

#### 2.3.4.2 Voltage proof

Initial voltage proof 1000 V r.m.s sinus min.  
Voltage proof 1000 V r.m.s sinus min. after damp heat steady state test.  
Conditions: ETX 1056-104 clause 4.3.2.



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### 2.3.4.3 Current carrying capacity

<b>Current carrying capacity</b>	<b>Ambient temperature</b>
<b>0.3A</b>	<b>70°C</b>

Maximum increase in temperature 10°C at 0,3A, in all contacts.

Conditions:ETX 1056-104, clause 4.4.1.

Arrangement according to fig. 12 in clause 2.4.2.

### 2.3.4.4 Contact resistance

Initial contact resistance according to table 3.

Contact resistance max. increase 10mΩ after heat ageing.

Conditions: ETX 1056-104,clause 4.2.1.

Arrangement according to figure 13 in clause 2.4.3.

**Table 3 :**


Arrangement	Row	Resistance
Contact/contact	a	25 mΩ max
Contact/contact	b	35 mΩ max
Contact/contact	c	40 mΩ max
Contact/contact	d	45 mΩ max

### 2.3.4.5 Insulation resistance

Initial insulation resistance 5000Ω Min.

Insulation resistance 1000Ω Minimum, after damp heat steady state test.

Conditions: ETX 1056-104, clause 4.3.1.

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### 2.3.4.6 Signal transmission

Worst case multiline differential NEXT (one pair is "listening" and nearest 11 pair are driven, 1V step, 50Ω system impedance) periodic differential signals at 1 ns risetime.

Cross	21%	-14 dB
Vertical	29%	-11 dB
Horizontal	25%	-12 dB

Worst case multiline differential NEXT (one pair is "listening" and nearest 5 pair are driven 1V step, 50 system impedance) periodic differential signals at 1 ns risetime.

Cross	6%	-24 dB
Vertical	8%	-22 dB
Horizontal	7%	-23 dB

Reference: U/ME-97: 049, rev. B.


### 2.3.4.7 Termination resistance, IDC-section

Contact resistance max increase 1mΩ after step 6 (heat ageing) in test procedure (compared to initial values). Max increase between step 7 and fully performed test procedure is 1mΩ (compared to values after step 6).

Conditions: ETX 1056-104, clause 4.2.1.  
Standard atmospheric conditions.  
Arrangement according to figure 15 clause 2.4.4.

Connector terminated with cables 4 pairs, cable dia 0.4mm, outer dia 5.5±.005 for AWG 26 and for AWG 30 use cable

1. Pulling test according to fig. 17. Applied force 100 N for 10 sec, 2 cycles.
2. Bending test according to fig. 18, 10 cycles. One cycle is:  
Applied force 10 N along the cable-axis where it fits into the covers, a 90° bend upwards, a 90° bend downwards and then back to normal position.

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3. Twisting test according to fig. 19, 5 cycles. The first cycle is:  
Applied force 10 N along the cable-axis where it fits into the covers,  
a 90° bend downwards (start position), a 180° twist clockwise then  
back 180° counterclockwise to start position, twist 180°  
counterclockwise and back to start position. The second cycle starts  
with a 90° bend of cable in the opposite direction compared to the first  
cycle, then the same procedure as the first cycle. During the test,  
a tensile load of 10 N shall be applied to the cable.

4. Vibration, sinusoidal vibration according to IEC 68-2-6 test Fc,  
10-500 Hz, 0,75 mm, 98 m/s<sup>2</sup>, 3x10 sweep cycles.

5. Change of temperature: Rapid change of temperature according to  
IEC 68-2-14 test Na, -55°C, +85°C, 3h, 100 cycles.

6. Heat ageing 56 days in 85°C according to IEC 68-2-2 test Bb.

7. Damp heat: Damp heat steady test according to IEC 68-2-3, 40°C,  
90-95% rel. humidity in 56 days.

8. Corrosion 21 days according to IEC 60068-2-60, test Ke, method 2:  
200 ppb NO<sub>2</sub>, 10 ppb H<sub>2</sub>S, 10 ppb Cl<sub>2</sub>, 30°C, 70% R.H., film on  
Cu 0,3-1,0 mg/m<sup>2</sup>, d.

### 2.3.4.8 Transfer impedance -EMC

Bulk Current Injection method acc. to ETX/U/ME-97:072 rev.B.  
Zt max. 50 mΩ from 0,3 MHz to 100 MHz (harnesses).

## 2.3.5 Mechanical

### 2.3.5.1 Mechanical operations

Number of operations: 200 minimum.


Conditions: IEC 512-5, test 9a.

Standard atmospheric conditions.

Frequency of operations: 100 cycles/h.

Speed of operation: 10mm/s maximum.

Rest: 30s unmated.

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### 2.3.5.2 Insertion and withdrawal forces

Total insertion force for the connector: 0,94N x 24 max fully equipped.  
Insertion force: n x 0,50N max (n= number of contacts involved).  
Individual withdrawal force: 0,15 N min.  
Conditions: IEC 512-7, test 13b.  
Rate of engagement and separation: 2mm/s maximum.  
Fully equipped connectors.

### 2.3.5.3 Contact retention in insert

Force to be applied: 5 N.  
Conditions: IEC 512-8 test 15a.  
Standard atmospheric conditions.  
The maximum axial displacement after the force has been removed shall not exceed 0,1 mm.  
Min. 10 readings per connector.  
Fully equipped connectors.

### 2.3.5.4 Cable clamp retention force


Axial retention force: 100N min.

### 2.3.5.5 Contact force

#### 2.3.5.5.1 Contact spring force

Initial contact spring force 0,50N min.  
Contact spring force 0,50N min., after 200 mechanical operations.  
Contact spring force 0,40N min., after heat ageing, end of life.

Recommended:  
Initial contact spring force 1,1-1,4N min.  
Contact spring force 1,1-1,4N, after 200 mechanical operations.  
Contact spring force 1,0-1,4N min., after heat ageing.  
Conditions: ETX 1056-104, clause 4.6.2.

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 45 of 105	REVISION G
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### 2.3.5.5.2 Contact force, off centre

Initial contact force, off centre 0,40N min.  
Contact force, off centre 0,40N min., after 200 mechanical operations.  
Contact force, off centre 0,30N min., after heat ageing.

Recommended:

Initial contact force, off centre 0,7-1,3N min.  
Contact force, off centre 0,7-1,3N min., after 200 mechanical operations.  
Contact force, off centre 0,7-1,2N min. after heat ageing.  
Conditions: ETX 1056-104, clause 4.6.3.

### 2.3.5.6 Misaligned mating

The connector shall withstand a misaligned mating with 72844 and 72858 of  $\pm 2^\circ$  according to fig. 15 in clause 4.5, without negative effect on the contacts. Verifying will be done by a design analysis

### 2.3.5.7 Strain relief and cable displacement

Displacements of cable 0,8 mm max. after pull of cable, acc. to fig.11.

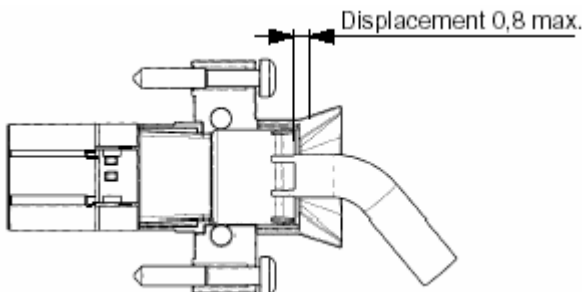



fig.11

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 46 of 105	REVISION G
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## 2.4 Testing

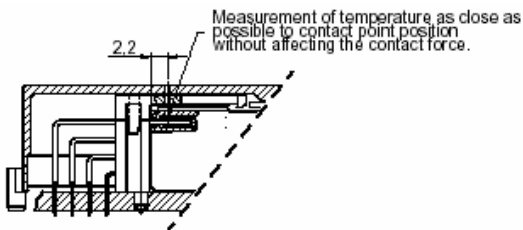
### 2.4.1 General

According to testing schedule described in ETX 1056-104.  
The manufacturing process and/or vendors initial specification may not be changed after type testing and approval without permission from design responsible.

### 2.4.2 Current carrying capacity

For conditions see clause 2.3.4.3.

fig.12



### 2.4.3 Contact resistance

For conditions see clause 2.3.4.4.

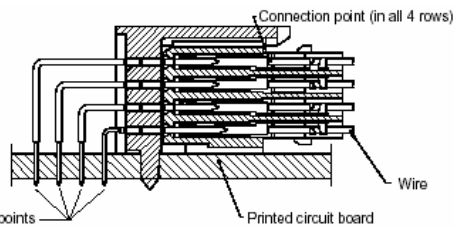



fig.13

### 2.4.4 Termination resistance

For conditions see clause 2.3.4.7.

For HM1C16D2J110EBLF

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 47 of 105	REVISION G
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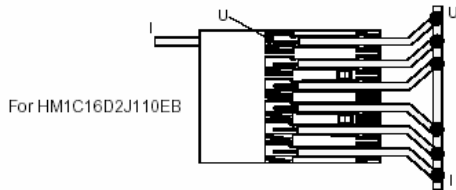


fig.14

### 2.4.5 Misaligned mating

For conditions see clause 2.3.5.6.

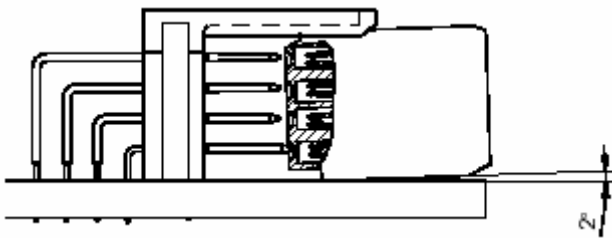


fig.15

### 2.4.6 Pull, bend and twist test of the cable

Conditions: ETX 1056-104 clause 5.2.3.

During the pull-bend- and twist tests, the IDC-connector shall be mounted in housings with connected cable as specified for HM1C16D2J110xxLF.

Pull test:

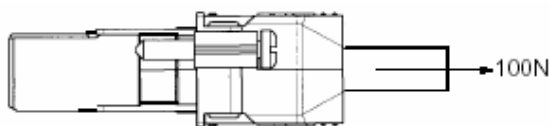


fig.16

Bend test:

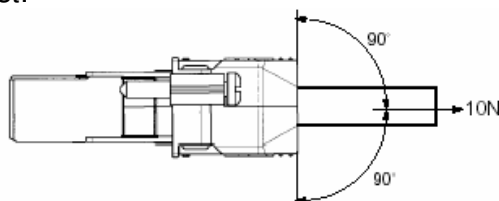



fig.17

Twist test:

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 48 of 105	REVISION G
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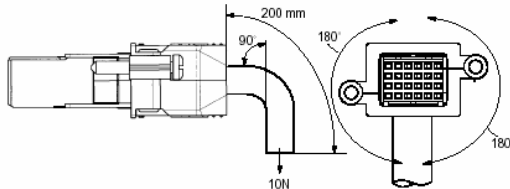


fig.18

## 2.5 Packing

### 2.5.1 Packing for transport

If the connector consists of two or more pieces, they shall be packed together. Different sub-parts shall be separated from other subparts. All packing material shall be ESD neutral.


Packing shall be made so that:

- a no damage or deformation of the terminals will occur
- b no particles or parts from the packing will enter into the contacts cavities and no gases or acids from packing materials will harm the housing or the contact elements
- c the connectors can be removed without problems from the packing without touching the terminals or deforming them

The secondary packing shall be marked with product number, manufacturer code and packing date.

Kit packaging. Under consideration.



NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 49 of 105	REVISION G
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## 2.6 Product number

### 2.6.1 Contact arrangement

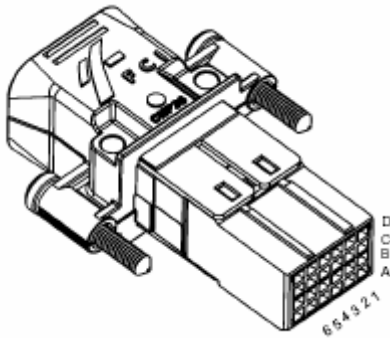
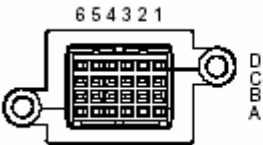



fig.19

Table 4

Standard arrangement			
	Fig	Number of contacts	Information
1		24	Fully equipped

### 2.6.2 Product identification

Covers:  
Marked with FCI product number and company logo.  
Shroud:  
Marked with FCI product number .

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> <b>P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF</b> <b>HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF</b> <b>10054379-x01LF 10074494-x01LF/x31LF</b>		PAGE <b>50 of 105</b>	REVISION <b>G</b>
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CLASSIFICATION <b>UNRESTRICTED</b>			

Terminal block:  
 Marked with FCI product number, year and week code.

### 2.6.3 Specification key

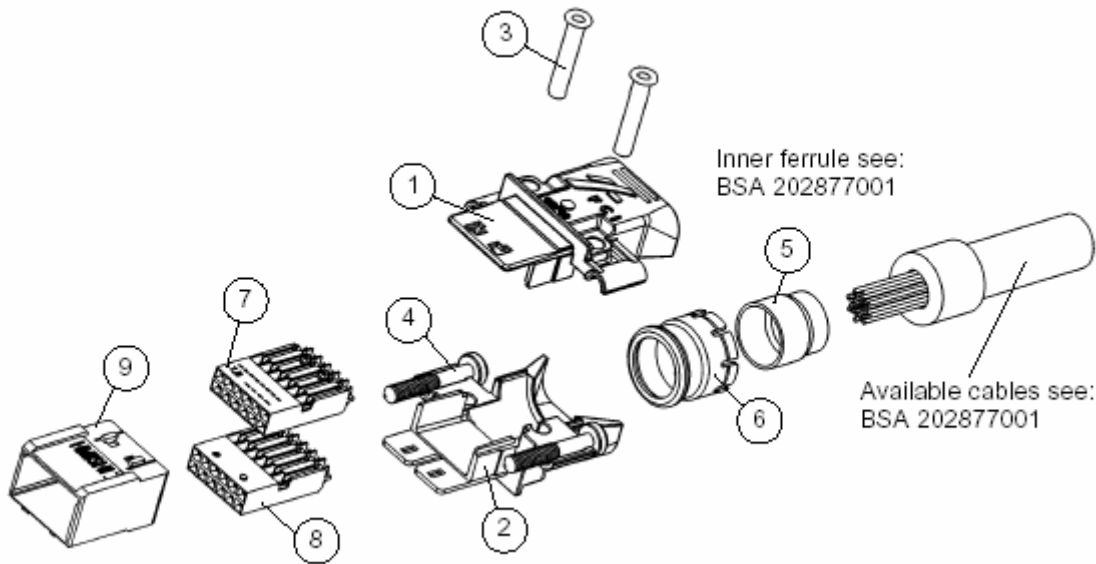



fig.20


NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 51 of 105	REVISION G
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Pos	Product name	Product number	HM1C16D2J110EBLF	HM1C16D0J110EBLF
1	Topt die-cast cover	HM1C16P36BLF	1	1
2	Bottom die-cast cover	HM1C16P38BLF	1	1
3	Rivet	HPTE1624BLF	2	2
4	Screw	HPTE1623BLF	2	2
5	Inner ferrule**	See 1301-RNY104 36	1**	1**
6	Outer ferrule	HM1C01CR1BLF	1	1
7	Right terminal block	HM1C16D20R10EBLF	1	"
		HM1C16D00R10EBLF	"	1
8	Left terminal block	HM1C16D20L10EBLF	1	"
		HM1C16D00L10EBLF	"	1
9	shroud	HM1SH1BLF	1	1

\*\* Always ordered separately.

## 2.7 References

IEC 68-1	Environmental testing, Part 1: General and guidance.
IEC 68-2	Environmental testing, Part 2:Tests.
IEC 512	Electromechanical components for electronic equipment; basic testing procedures and measuring methods.
IEC 60068-2-60	Flowing mixed gas corrosion test: Test Ke.
ETX 1056-104	Type testing program and demands for electrical connectors.
GS-12-307	Product specification.  Generic Product specification of 4X6 Signal

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> <b>P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF</b> <b>HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF</b> <b>10054379-x01LF 10074494-x01LF/x31LF</b>		PAGE 52 of 105	REVISION G
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UL 1950

Standard for safety of information  
technology equipment, 3rd edition.

IEC 609 50

Safety of information technology equipment.

ETX/U/ME 97:072

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 53 of 105	REVISION G
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### 3. PART Bb - 4X6 SIGNAL (SOLDER)

#### 3.1 General

##### 3.1.1 General information

The specification is as well valid for the Lead Free/RoHS compatible products

##### 3.1.2 Ratings and characteristics


This document is describing a shielded metric round cable connector module for signal transmission. Basic grid is 0,5 mm. The minimum PCB spacing is 20 mm. The connector module consists of a contact unit and a die-casted metal cover. Connection to the cable is realized with solder connection.

**Table 1:**

Rated voltage	130V r.m.s sinus (contact/contact) min.
Current rating at 70°C	0.3A min.
Initial insulation resistance	5000 MΩ min.
Cable (round)	Total diameter Ø8,0 mm max. Max 4 single wires, wire thickness Max Ø1,9 mm and with a max. Ø0,4 mm solid tinplated conductor.

##### 3.1.3 Performance level

PERFORMANCE LEVEL	
XXXXX-1xxLF	<b>Standard Product</b>
XXXXX-XxxLF	<b>Customer Special</b>

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 54 of 105	REVISION G
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### 3. 2 Dimensions and material

#### 3. 2.1 Connector dimensions (without ear)

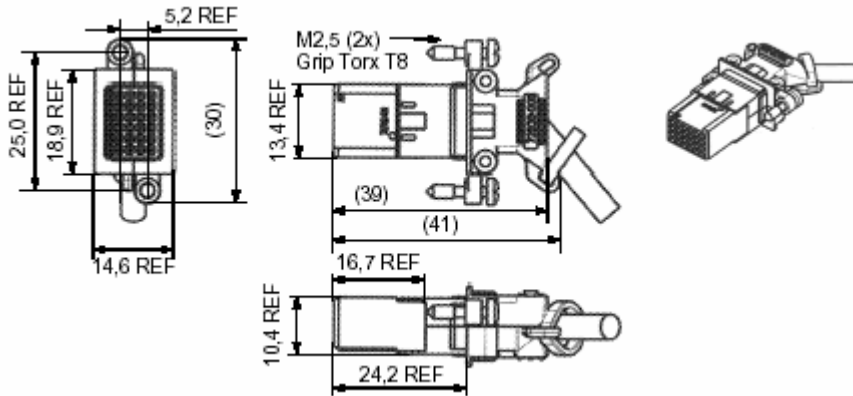


fig.1

#### Connector dimensions (with ear)

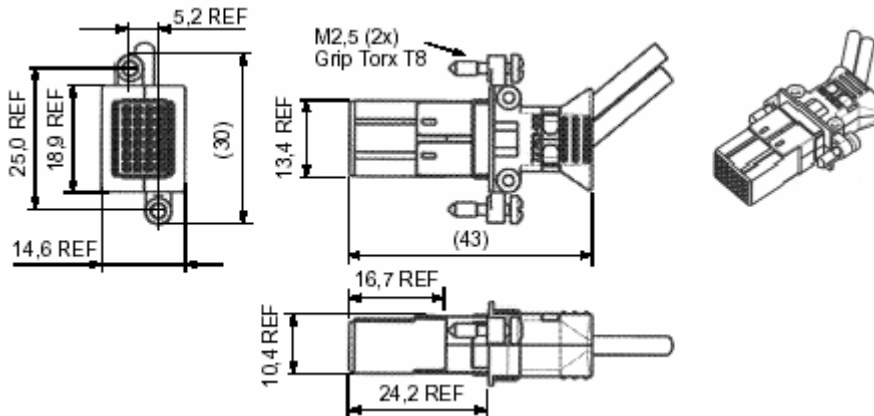



fig.2

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HMC16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 55 of 105	REVISION G
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### 3. 2.1.1 Housing dimension

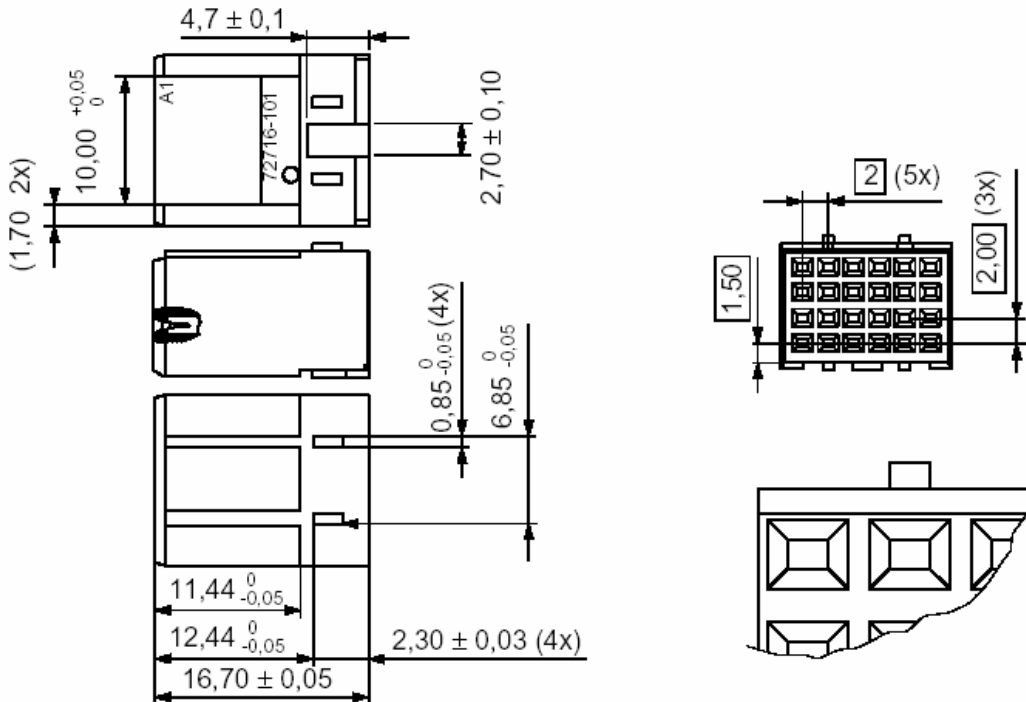


fig.3

### 3. 2.1.2 Screw and rivet

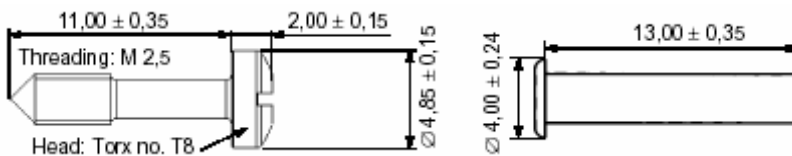



fig.4

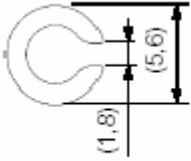
### 3. 2.1.3 Disc spring



fig.5

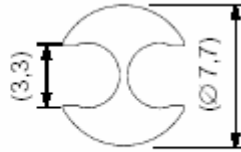
NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 56 of 105	REVISION G
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### 3. 2.1.4 Spacing sleeves



72760-001LF

fig.6



72759-001LF

### 3. 2.1.5 Clamp

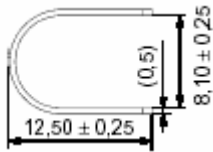
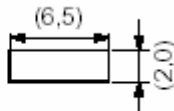


fig.7

### 3. 2.1.6 Shrink tubes



72762-101

fig.8

### 3. 2.1.7 Strap

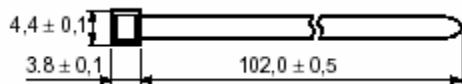



fig.9



NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 57 of 105	REVISION G
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CLASSIFICATION <b>UNRESTRICTED</b>			

### 3.2.2 Material

#### 3.2.2.1 Housing

Material: Liquid Crystal Polymer (Natural coloured LCP)  
Weight: 1,758 g/piece.

#### 3.2.2.2 Contact elements

Material: Phosphor bronze.  
Plating : See clause 3.2.3.4  
Weight: 0,026 g/piece.

#### 3.2.2.3 Covers

Material: Zinc alloy.  
Weight (with ear): 5,82 g/piece, (without ear): 6,19 g/piece

#### 3.2.2.4 Rivet

Material: Brass  
Weight: 0,24 g/piece.

#### 3.2.2.5 Screw

Material: Steel.  
Weight: 0,48 g/piece.

#### 3.2.2.6 Disc spring


Material: Steel.  
Weight: 0,16 g/piece.

#### 3.2.2.7 Spacing sleeves

Material: Neoprene  
Weight: 0,13 g/piece.

#### 3.2.2.8 Clamp

Material: Steel.

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 58 of 105	REVISION G
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Weight: 0,32 g/piece.

### 3.2.2.9 Shrink tube

Material: Polyethylene (72762-x01LF), Polyolefin (10023944-x01LF)  
Weight: 0,01 g/piece.

### 3.2.2.10 Strap

Material: Polyamide.  
Weight: 0,26 g/piece.

### 3.2.2.11 Total weight

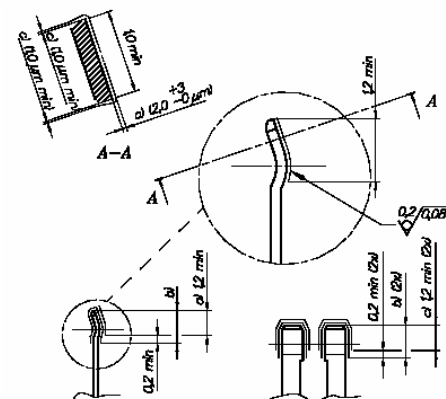
With ear: 16,11 g/piece.  
Without ear: 16,48 g/piece.

## 3.2.3 Contact dimensions and surface coating

### 3.2.3.1 Contact surface

The contact surface is specified in fig. 10. The specified values must be fulfilled at the whole specified area.


### 3.2.3.2 Surface coating



Surface coating:

- Hard gold
- Ni 1,27 μm min.
- Hard gold

fig.10

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 59 of 105	REVISION G
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### 3.2.3.3 Contact dimensions

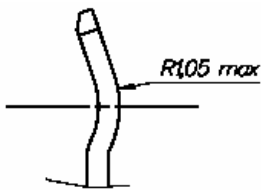
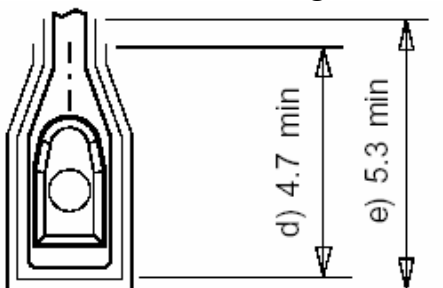


fig.11

### 3.2.3.4 Surface coating in terminals



e : Ni 2 µm. min  
d: Pure matte Sn 6 µm min

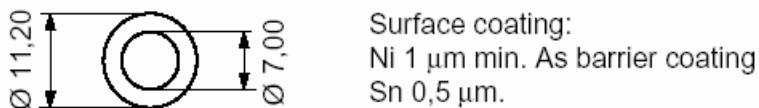
fig.12

### 3.2.3.5 Shield cover

Min. 3 µm Cu, min. 2 µm Ni, min. 6 µm Sn.  
After Cu, Ni, Sn plating the cover shall be passivated as a final step.  
The passivation shall not disturb the electrical conductance.

### 3.2.3.6 Disc spring

Used to make contact between screen and covers.




See details page 15.

fig.13

## 3.2.4 Mounting information

### 3.2.4.1 Application tools

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 60 of 105	REVISION G
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See GS-20-050

### 3.2.5 Recommended termination

See contact arrangement clause 3.6.1

### 3.2.6 Product safety

Housing material LCP.  
Spacing sleeve material Polypropylene and Neoprene.  
Shrink tube material Polyethylene and Polyolefin.  
Flammability class UL94-V0.

## 3.3 Characteristics

### 3.3.1 General

All characteristics refer to 72817-x03LF, 72817-x04LF and 72844-x0xLF, 72858-x0xLF. (mated pair of connectors).

Approved cables :

Conductor dia0.4mm, Maximum dia 5.0mm,4 pairs, AWG 26

Conductor dia0.5mm,Outer dia 6.4±.2mm,4 pairs, AWG 24

Conductor dia0.51mm,Outer dia 2.5±.1mm, AWG 24

Conductor dia0.31±.005 mm, Outer dia 3.55±.15mm, AWG 28

Conductor dia0.31±.005 mm, Outer dia 3.55±.15mm, AWG 28

4 x Conductor dia0.31±.005 mm, Outer dia 2.75±.10mm, AWG 28

(2 x Conductor dia0.31±.005 mm, Outer dia 3.55±.15mm, AWG 28 can be used but not recommended).

### 3.3.2 Reference environment


According to IEC 68-1 clause 5.3.1.

**Table 2:**

Temperature	15°-35°C
Rel.humidity	25%-75%
Atmospheric pressure	86-106kPa

**Table 3:**

storage	Max. temperature	50°C
	Min. temperature	-40°C
Range of uses	Max. temperature	70°C
	Min. temperature	-40°C

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 61 of 105	REVISION G
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CLASSIFICATION <b>UNRESTRICTED</b>			

### 3.3.3 Climate category

### 3.3.4 Electrical

#### 3.3.4.1 Creepage and clearance distances

Minimum creepage and clearance distance between contacts is 0,4 mm and between contacts and ground is 0,4 mm.

#### 3.3.4.2 Voltage proof

Initial voltage proof 700 V r.m.s sinus min.  
Voltage proof 700 V r.m.s sinus min. after damp heat steady state test.  
Conditions:  
ETX 1056-104 clause 4.3.2.

#### 3.3.4.3 Current carrying capacity

Current carrying capacity	Ambient temperature
0,3 A	70°C


Maximum increase in temperature 10°C at 0,3A, in all contacts.  
Conditions: ETX 1056-104 clause 4.4.1.  
Arrangement according to fig. 15 in clause 3.4.2.

#### 3.3.4.4 Contact resistance

Initial contact resistance according to table 4.  
Contact resistance max. increase 10 m after heat ageing.  
Conditions: ETX 1056-104 clause 4.2.1.  
Arrangement according to fig. 16 in clause 3.4.3.1.

**Table 3:**

Arrangement	Row	Resistance
Contact/contact	a	25 mΩ max
Contact/contact	b	35 mΩ max
Contact/contact	c	40 mΩ max

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 62 of 105	REVISION G
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Contact/contact	d	45 mΩ max
-----------------	---	-----------

### 3.3.4.5 Insulation resistance

Initial insulation resistance 5000 MΩ minimum. Insulation resistance 1000 MΩ minimum, after damp heat steady state test.  
Conditions: ETX 1056-104 clause 4.3.1.

### 3.3.4.6 Transfer impedance-EMC

Zt max. 50 mfrom 0,3 MHz to 100 MHz.

### 3.3.4.7 Signal transmission

Worst case multiline differential NEXT (one pair is "listening" and nearest 11 pair are driven, 1V step, 50system impedance) periodic differential signals at 1 ns risetime.

Cross	21%	-14 dB
Vertical	29%	-11 dB
Horizontal	25%	-12 dB


Worst case multiline differential NEXT (one pair is "listening" and nearest 5 pair are driven 1V step, 50system impedance) periodic differential signals at 1 ns risetime.

Cross	6%	-24 dB
Vertical	8%	-22 dB
Horizontal	7%	-23 dB

Reference: U/ME-97: 049, rev. B.

### 3.3.4.8 Solder ability

Conditions: ETX 1056-104 clause 4.11.

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 63 of 105	REVISION G
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### 3.3.5 Mechanical

#### 3.3.5.1 Mechanical operations

Number of operations: 200 minimum.  
Conditions:  
IEC 512-5, test 9a.  
Standard atmospheric conditions.  
Frequency of operations: 100 cycles/h.  
Speed of operation: 10 mm/s maximum.  
Rest: 30s unmated.

#### 3.3.5.2 Contact retention in insert

Force to be applied: 5 N.  
Conditions:  
IEC 512-8 test 15a.  
Standard atmospheric conditions.  
The maximum axial displacement after the force has been removed shall not exceed 0,1 mm.  
Min. 10 readings per connector.  
Fully equipped connectors.

#### 3.3.5.3 Contact force


##### 3.3.5.3.1 Contact spring force

Initial contact spring force 0,50 N min.  
Contact spring force 0,50 N min., after 200 mechanical operations.  
Contact spring force 0,40 N min., after heat ageing.  
Conditions: ETX 1056-104 clause 4.6.2.

##### 3.3.5.3.2 Contact force, off centre

Initial contact force, off centre 0,40 N min.  
Contact force, off centre 0,40 N min., after 200 mechanical operations.  
Contact force, off centre 0,30 N min., after heat ageing.  
Conditions: ETX 1056-104 clause 4.6.3.

#### 3.3.5.4 Misaligned mating

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 64 of 105	REVISION G
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The connector shall withstand a misaligned mating with 72844 and 72858. of  $\pm 2^\circ$  according to fig. 17 in clause 3.4.4, without negative effect on the contacts. Verifying will be done by a design analysis. Arrangement according to fig. 17 in clause 3.4.4.

## 3.4 Testing

### 3.4.1 General

The connector shall undergo the testing schedule described in ETX 1056-104. This testing is a type testing and an approval will be a result of a judging procedure depending of the result of the testing. The manufacturing process and/or the vendors internal specification may not be changed after type testing and approval without permission from design responsible.

### 3.4.2 Current carrying capacity

For conditions see clause 3.3.4.3.

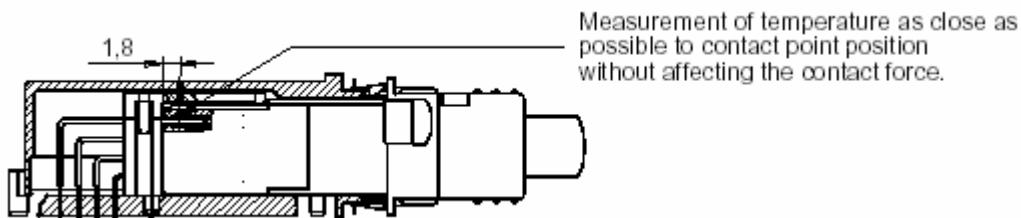


fig. 1

### 3.4.3 Contact resistance

#### 3.4.3.1 Contact resistance

For conditions see clause 3.3.4.4.

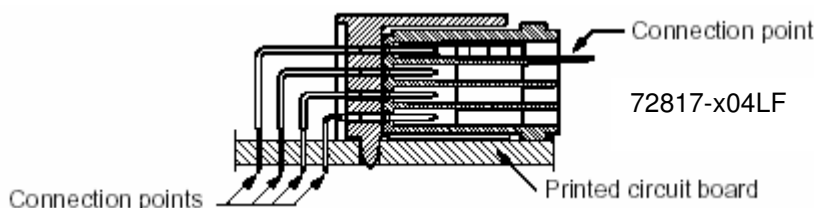



fig. 16

#### 3.4.3.2 Transfer impedance



NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 65 of 105	REVISION G
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According to IEC 46 A (c.o.) 142.

### 3.4.4 Misaligned mating

For conditions see clause 3.3.5.4.

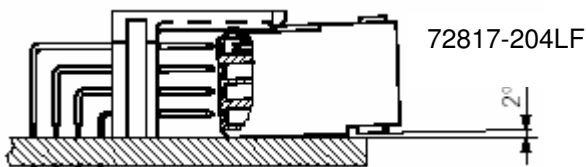


fig.17

### 3.4.5 Pull, bend and twist test of the cable

Conditions:

ETX 1056-104 clause 5.2.3.

During the pull-bend- and twist tests, the contacts shall be mounted in housings with connected cable as specified for 72817.

Pull test:

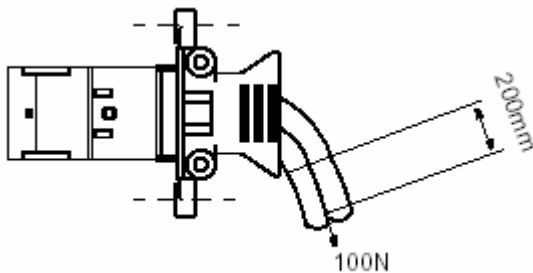


fig.18

Bend test:

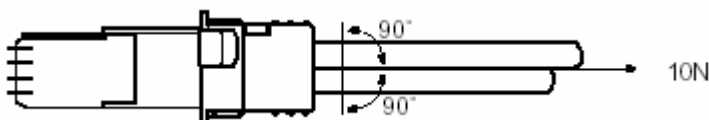
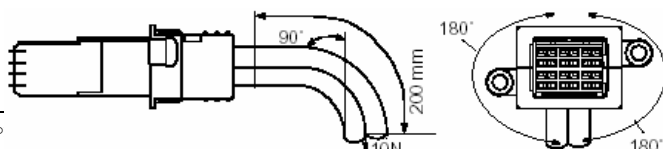



fig.19

Twist test:



Cop  
For  
Rev F

GS-01-001

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 66 of 105	REVISION G
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*fig.20*


## 3.5 Packing

### 3.5.1 Packing for transport

Packing shall be made so that:

- a) no damage or deformation of the terminals will occur
- b) no particles or parts from the packing will enter into the contacts cavities and no gases or acids from packing materials will harm the housing or the contact elements
- c) the connectors can be removed without problems from the packing without touching the terminals or deforming them

The packing shall be marked with product number, manufacturer code and packing date.

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 67 of 105	REVISION G
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### 3.6 Product number

#### 3.6.1 Contact arrangement

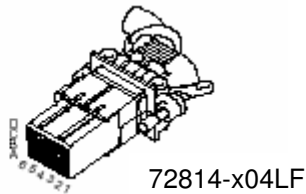
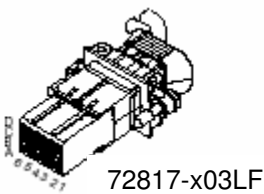
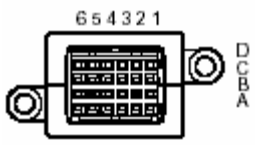
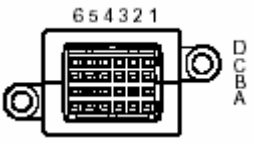


fig.21


Table 7

Standard arrangement		
Fig	Number of contacts	Termination Information
	2	B2,B5
	4	D1,D2,D5,D6

#### 3.6.2 Product identification

Covers: Marked with product number and company logo.

Housing: Marked with product number, batch number and factory code.

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 68 of 105	REVISION G
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### 3.6.3 Specification key

\*) without ear  
72817-x03LF

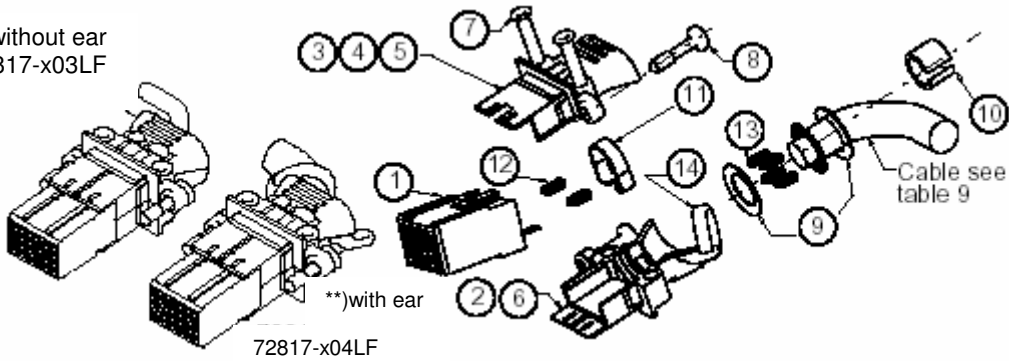



fig.22

Table 8

Pos	Product name	Product number	72817-x03LF	72817-x04LF
1	Connector	72742-201LF	1	--
		72742-202LF	--	1
2	Cover-half*	72763-001LF	1	--
3	Cover-half*	72764-001LF	1	--
4	Cover-half**	72840-001LF	--	1
5	Cover-half**	72839-001LF	--	1
6	Tubular rivet	72812-002LF	2	2
7	Screw	72813-002LF	2	2
8	Disc spring	72822-201LF	2	2
9	Spacing Sleeve	72759-001LF	1	--
		72760-001LF	1	--
10	Clamp	72825-001LF	1	1
11	Shrink tube	72762-101LF	--	2
11	Cable clamp	72826-002LF	--	1

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 69 of 105	REVISION G
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### 3.6.4 Product list


Available products.

**Table 9**

Product Number	Designed for cable
72817-x03LF	Conductor dia0.31±.005 mm, Outer dia 3.55±.15mm, AWG 28
72817-x04LF	Conductor dia0.4mm,Maximum dia 5.0mm,4 pairs, AWG 26  Conductor dia0.5mm,Outer dia 6.4±.2mm,4 pairs, AWG 24

### 3.7 References

IEC 68-1	Environmental testing, Part 1: General and guidance.
IEC 68-2	Environmental testing, Part 2:Tests.
IEC 512	Electromechanical components for electronic equipment; basic testing procedures and measuring methods.
ETX 1056-104	Type testing program and demands for electrical connectors.
GS-12-307	Product specification. Generic Product specification of 4X6 Signal
IEC 50/B/WG6	Flowing mixed gas corrosion test: Test Ke
IEC 46 A (c.o.)142	Wire Injection Measuring Method.

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 70 of 105	REVISION G
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## 4.PART C (3 X 24 SIGNAL) IDC CABLE CONNECTOR

### 4.1 General

#### 4.1.1 General information

The specification is as well valid for the Lead Free/RoHS compatible products

#### 4.1.2 Ratings and characteristics


This document is describing a metric cable connector for signal transmission. Basic grid is 0,5 mm with contact springs at 2 mm grid. The connector consists of 6 terminal blocks (2x6 position), three shrouds, two screws M2.5 x 15 and a two-piece zinc cover.

**Table 1:**

Rated voltage	130V r.m.s sinus (contact/contact) min.
Current rating at 70 °C	0.3A min.
Initial insulation resistance	5000 MΩ min.
Cable (round)	Max 72 single wires, wire thickness Max Ø10,3mm(nom: 9.4mm) including isolation and conductor. solid tin plated conductor Ø0,4 mm.

#### 4.1.3 Performance level

<b>PERFORMANCE LEVEL</b>	
XXXXX-1xxLF	<b>Telcordia CO</b>
XXXXX-XxxLF	<b>Customer Special</b>

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 71 of 105	REVISION G
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## 4.2 Dimensions and material

### 4.2.1 Connectors dimension

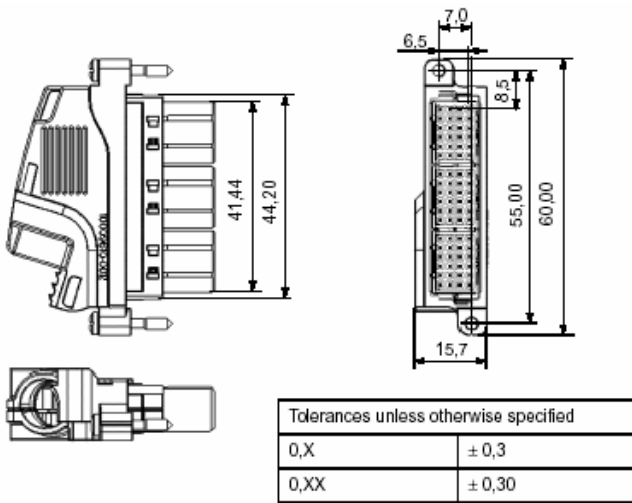


fig.1

#### 4.2.1.1 Contact unit

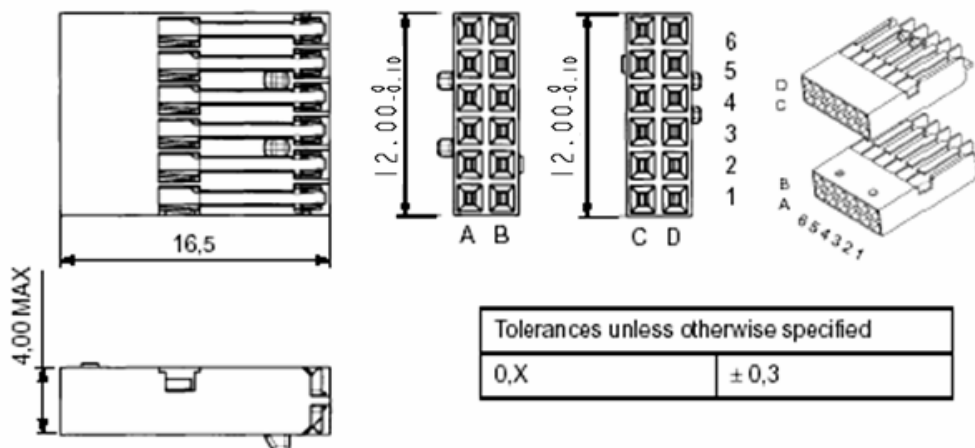

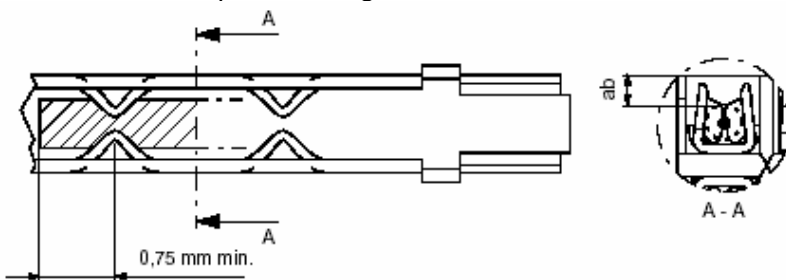


fig.2

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HMLC16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 72 of 105	REVISION G
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### 4.2.1.2 IDC-slot dimensions

The copper conductor shall extend at least 0.75 mm beyond the IDC dimples, see fig.3.



Insulation	ab
0.6 mm Ø ≥	1.48 - O.D min.
0.6 mm Ø <	0.88 min.

O.D = Outside Diameter of wire insulation.

fig.3

### 4.2.1.3 Shroud (3x)

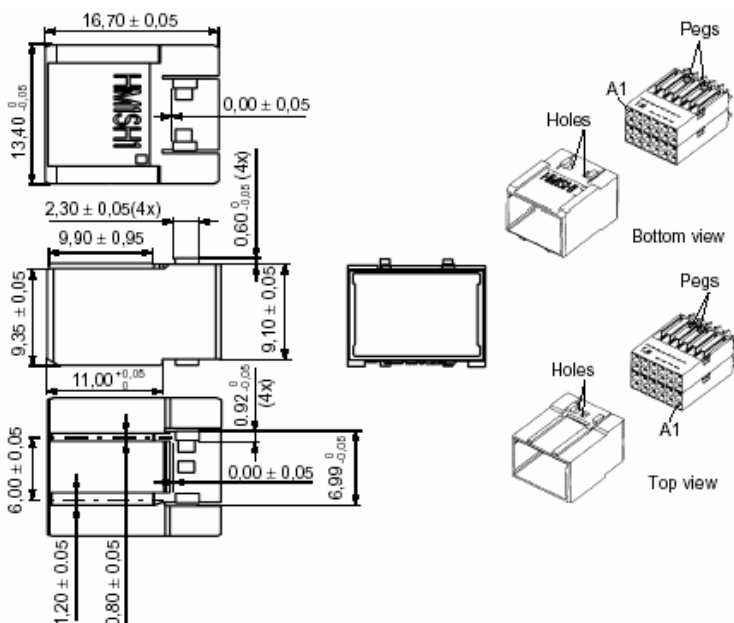



fig.4



NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 73 of 105	REVISION G
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#### 4.2.1.4 Lower cover part

##### Lower cover part

Tolerances unless otherwise specified	
0,XX	± 0,30

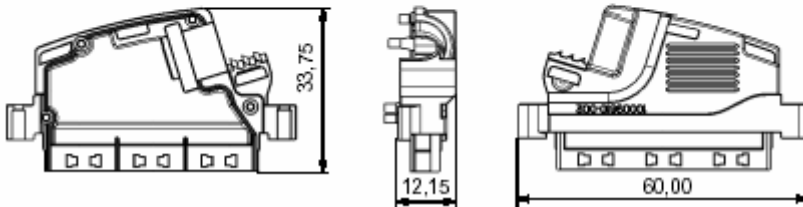
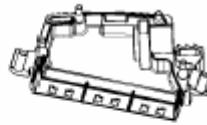


fig.5

#### 4.2.1.5 Upper cover part

Tolerances unless otherwise specified	
0,XX	± 0,30

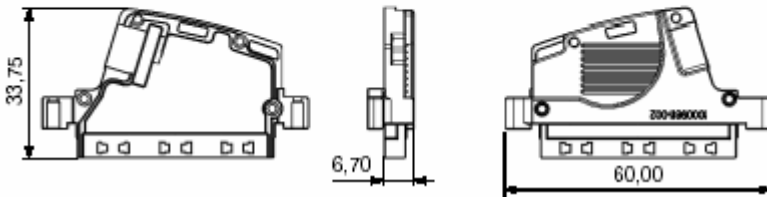
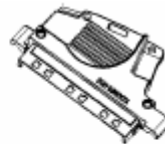
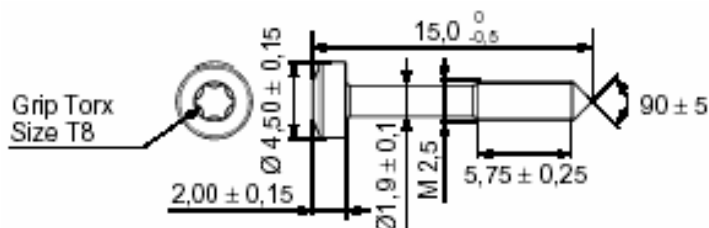


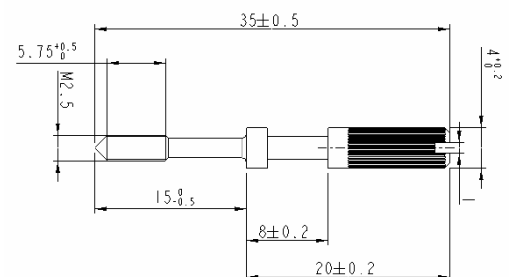
fig.6


#### 4.2.1.6 Screw

##### Torx screw



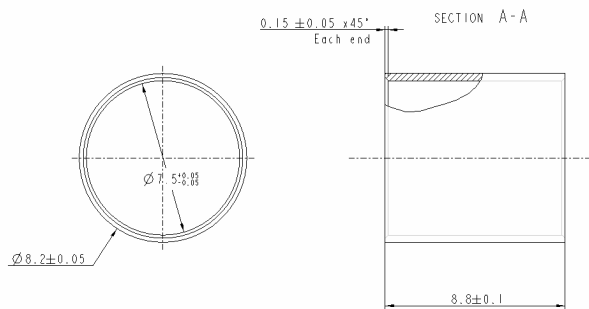
##### Thumb screw



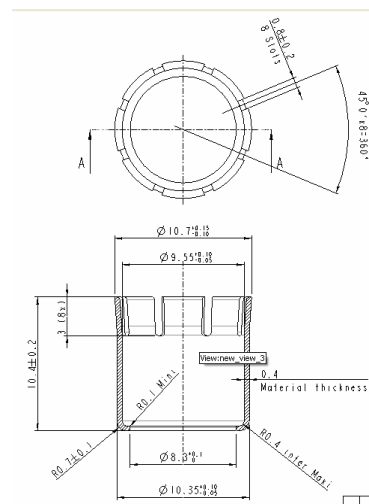
NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 74 of 105	REVISION G
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#### 4.2.1.7 Ferules (only for 10074494-xxxLF)

##### Inner ferules



##### Outer ferule



## 4.2.2 Material

### 4.2.2.1 Shroud and terminal block

Terminal block material: Polyester (PBTP), 30% glass-filled.  
Shroud material: Polyamide, 30% glass-filled.  
Total weight: 9,75 g.

### 4.2.2.2 Contact elements


Material: Phosphor bronze.  
Plating: see clause 4.2.4.  
Weight: 0,067 g/piece.

### 4.2.2.3 Covers

Material: Zinc alloy.  
Plating: min. 6µm Sn over min. 2µm Ni over min. 3µm Cu.  
After Sn, Ni, Cu plating the cover shall be passivated as a final step.  
The passivation shall not disturb the electrical conductance.  
Weight upper cover: 20,9 g/piece.  
Weight lower cover: 23,2 g/piece.

### 4.2.2.4 Screws

Material: Steel.

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Plating: 4-7 µm Ni (electroplated).  
Weight: 0,956 g/piece.

#### 4.2.2.5 Metal tie-wrap

Preferred tie-wrap: Stainless Steel tie-wrap.

#### 4.2.2.6 Ferules

Material: Brass  
Plating: 1-7 µm Ni + Tin 8µm  
Outer weight: 1.12 g/piece. / Inner weight : 0.668 g/piece

#### 4.2.2.7 Connector total weight

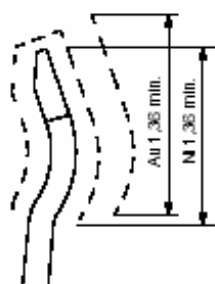
Total weight of connector 10013881-xx1LF is 60.3 g/piece.  
10074494-xx1LF is 62.1g/piece

#### 4.2.3 Product safety

The insulators shall be molded of Polyester (PBTP) and Polyamide.  
Flammability class UL94-V0.

#### 4.2.4 Surface coating, contact element

##### 4.2.4.1 Contact surface



Surface coating:

- a) Hard gold
- b) Ni 1,27 µm min.

fig.8

##### 4.2.4.2 Coating termination area

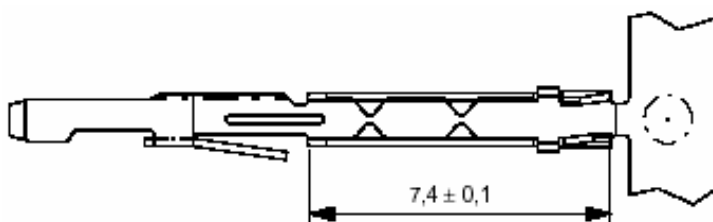



fig.9

Ni 1,0 ±0,5 µm.  
Pure matte Sn 2 to 5 µm

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 76 of 105	REVISION G
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## 4.2.5 Mounting information

### 4.2.5.1 Wire termination

Cable terminator: BPY6736PC1UK-plus kit BPY6736A4.  
Handpistol: BPY13836

### 4.2.5.2 Cover closing

Closing of covers and shroud will be done by riveting (HM1Y512).  
Connector cannot be repaired after closing.  
See Document GS-20-050.

### 4.2.5.3 Tie-wrapping

Hand tool: HM1Y489.  
Applied force see document GS-20-050

## 4.2.6 Recommended termination

No recommended termination.

## 4.3 Characteristics

### 4.3.1 General

All characteristics refer to 10013881-x01LF and 10022805-x01LF and 10051941-x01LF (mated pair of connectors).

Approved cables are:

Conductor diameter 0.4mm, 26 AWG, maximum dia 0.65mm

The connector has been designed to hold the following cable configurations:


One conductor diameter 0.4mm, 26 AWG, maximum dia 0.65mm

### 4.3.2 Reference environment

According to IEC 68-1 clause 5.3.1

**Table 2:**

Temperature	15°-35°C
Rel.humidity	25%-75%

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 77 of 105	REVISION G
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Atmospheric pressure	86-106kPa
----------------------	-----------

### 4.3.3 Climate category

**Table 3:**

storage	Max. temperature	50°C
	Min. temperature	-40°C
Range of uses	Max. temperature	70°C
	Min. temperature	-40°C

### 4.3.4 Electrical

#### 4.3.4.1 Creepage and clearance distances

Minimum creepage and clearance distance between contacts is 0,4 mm and between contacts and ground is 0,4 mm.

#### 4.3.4.2 Voltage proof

Initial voltage proof 1000 V r.m.s sinus min.  
Voltage proof 1000 V r.m.s sinus min. after damp heat steady state test.

Conditions: ETX 1056-104 clause 4.3.2.

#### 4.3.4.3 Current carrying capacity

Current carrying capacity	Ambient temperature
0,3 A	70°C


Maximum increase in temperature 10° C at 0,3A, in all contacts.  
Conditions:  
ETX 1056-104, clause 4.4.1.

Arrangement according to fig.10 in clause 4.4.2.

#### 4.3.4.4 Contact resistance

Initial contact resistance according to table 4.  
Contact resistance max. increase 10mΩ after heat ageing.

Conditions: ETX 1056-104, clause 4.2.1.

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TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 78 of 105	REVISION G
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Arrangement according to figure 11 in clause 4.4.3.

#### 4.3.4.5 Insulation resistance

**Table 4:**

Arrangement	Row	Resistance
Contact/contact	a	25 mΩ max
Contact/contact	b	35 mΩ max
Contact/contact	c	40 mΩ max
Contact/contact	d	45 mΩ max

Initial insulation resistance 5000 MΩ minimum.  
Insulation resistance 1000 MΩ minimum, after damp heat steady state test.  
Conditions: ETX 1056-104, clause 4.3.1.

#### 4.3.4.6 Signal transmission

No recommendations.

#### 4.3.4.7 Termination resistance, IDC-section


Contact resistance max increase 1mΩ after step 6 (heat ageing) in test procedure (compared to initial values). Max increase between step 7 and fully performed test procedure is 1mΩ (compared to values after step 6).

Conditions: ETX 1056-104, clause 4.2.1.  
Standard atmospheric conditions.

Arrangement according to figure 12 clause 4.4.4.

Connector terminated with cables conductor diameter 0.4mm,26 AWG, maximum dia 0.65mm .

1. Pulling test according to fig. 13. Applied force 50 N for 10 sec, 2 cycles.
2. Bending test according to fig. 14, 10 cycles.  
One cycle is: Applied force 5 N along the cable-axis where it fits into the covers, a 90° bend upwards, a 90° bend downwards and then back to normal position.

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TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 79 of 105	REVISION G
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3. Twisting test according to fig. 15, 5 cycles. The first cycle is:  
Applied force 5 N along the cable-axis where it fits into the covers, a 90° bend downwards (start position), a 180° twist clockwise then back 180° counterclockwise to start position, twist 180° counterclockwise and back to start position. The second cycle starts with a 90° bend of cable in the opposite direction compared to the first cycle, then the same procedure as the first cycle. During the test, a tensile load of 5 N shall be applied to the cable.
4. Vibration, sinusoidal vibration according to IEC 68-2-6 test Fc, 10-500 Hz, 0,75 mm, 98 m/s<sup>2</sup>, 3x10 sweep cycles.
5. Change of temperature: Rapid change of temperature according to IEC 68-2-14 test Na, -55°C, +85°C, 3h, 100 cycles.
6. Heat ageing 56 days in 85°C according to IEC 68-2-2 test Bb.
7. Damp heat: Damp heat steady test according to IEC 68-2-3, 40°C, 90-95% relative humidity in 56 days.
8. Corrosion 21 days according to IEC 50B/WG6, test Ke, method 2: 200 ppb NO<sub>2</sub>, 10 ppb H<sub>2</sub>S, 10 ppb Cl<sub>2</sub>, 30°C, 70% R.H., film on Cu 0,3 -1,0 mg/m<sup>2</sup>,d.

#### 4.3.4.8 Transfer impedance –EMC

Not applicable

#### 4.3.5 Mechanical

##### 4.3.5.1 Mechanical operations

Number of operations: 200 minimum.

Conditions: IEC 512-5, test 9a.

Standard atmospheric conditions.


Frequency of operations: 100 cycles/h.

Speed of operation: 10mm/s maximum.

Rest: 30s unmated.

##### 4.3.5.2 Insertion and withdrawal forces

Insertion force:  $n \times 0,50$  N max.(n= number of contacts involved).

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Individual withdrawal force: 0,15 N min.  
Conditions: IEC 512-7, test 13b.  
Rate of engagement and separation: 2mm/s maximum.  
Fully equipped connectors.

#### 4.3.5.3 Contact retention in insert

Force to be applied: 5 N.  
Conditions: IEC 512-8 test 15a.  
Standard atmospheric conditions.  
The maximum axial displacement after the force has been removed shall not exceed 0,1 mm.  
Min. 10 readings per connector.  
Fully equipped connectors.

#### 4.3.5.4 Contact force

##### 4.3.5.4.1 Contact spring force

Initial contact spring force 0,50N min.  
Contact spring force 0,50N min., after 200 mechanical operations.  
Contact spring force 0,40N min., after heat ageing, end of life.  
Conditions: ETX 1056-104, clause 4.6.2.

##### 4.3.5.4.2 Contact force, off centre

Initial contact force, off centre 0,40N min.  
Contact force, off centre 0,40N min., after 200 mechanical operations.  
Contact force, off centre 0,30N min., after heat ageing.  
Conditions: ETX 1056-104, clause 4.6.3.


##### 4.3.5.5 Misaligned mating


The connector shall withstand a misaligned mating with 10022805-x01LF and 10051941LF according to IEC 48B/61076-4-104 Ed1.

##### 4.3.5.6 Cable displacement

Max. displacement of cable(s) 1 mm after pull of cable(s) measured at the inside of the connector, behind the tie wrap.



NUMBER <p style="text-align: center;"><b>GS-12-308</b></p>	TYPE <p style="text-align: center;"><b>PRODUCT SPECIFICATION</b></p>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE <p style="text-align: center;">81 of 105</p>	REVISION <p style="text-align: center;">G</p>
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NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 82 of 105	REVISION G
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## 4.4 Testing

### 4.4.1 General

The connector shall undergo the testing schedule described in ETX 1056-104. This testing is a type testing and an approval will be a result of a judging procedure depending of the result of the testing. The manufacturing process and/or the vendors internal specification may not be changed after type testing and approval without permission from design responsible.

### 4.4.2 Current carrying capacity

For conditions see clause 4.3.4.3.

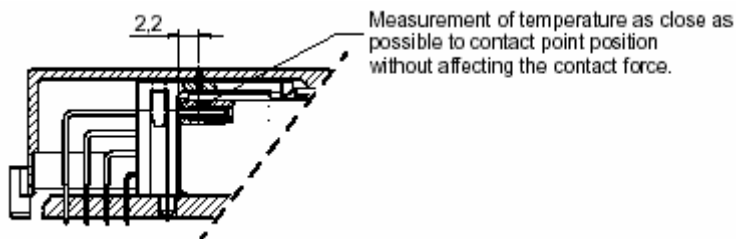


fig.10

### 4.4.3 Contact resistance

For conditions see clause 4.3.4.4.

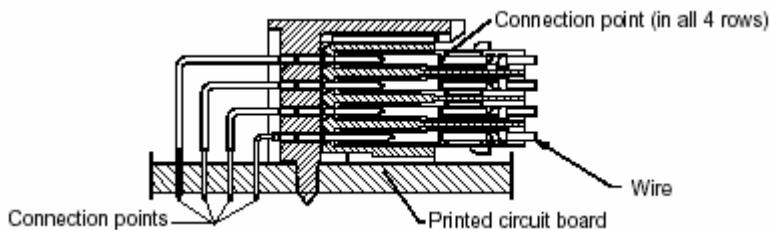



fig.11

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 83 of 105	REVISION G
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#### 4.4.4 Termination resistance

For conditions see clause 4.3.4.7.

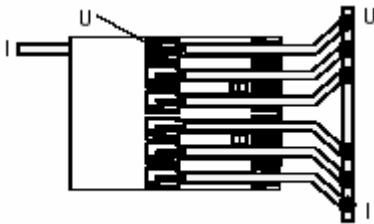


fig.12

#### 4.4.5 Pull, bend and twist test of the cable

Conditions: ETX 1056-104 clause 5.2.3.

During the pull-bend- and twist tests, the IDC-connector shall be mounted in housings with connected cable as specified for 10013881-xx1L For 10074494-xx1LF

Pull test:

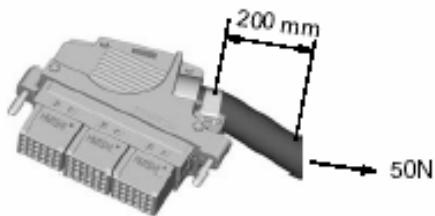


fig.13

Bend test:

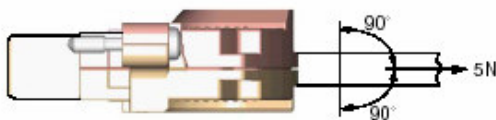


fig.14

Twist test:

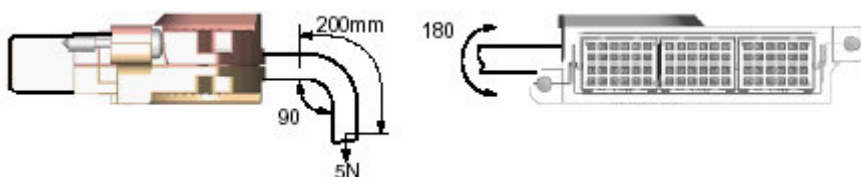



fig.15

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 84 of 105	REVISION G
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## 4.5 Packing

### 4.5.1 Packing for transport

Packing shall be made with ESD protection so that:

- a) no damage or deformation of the terminals will occur
- b) no particles or parts from the packing will enter into the contacts cavities and no gases or acids from packing materials will harm the housing or the contact elements
- c) the connectors can be removed without problems from the packing without touching the terminals or deforming them

The packing shall be marked with product number, manufacturer code and packing date.

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 85 of 105	REVISION G
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## 4.6 Product number

### 4.6.1 Contact arrangement

Contact arrangement

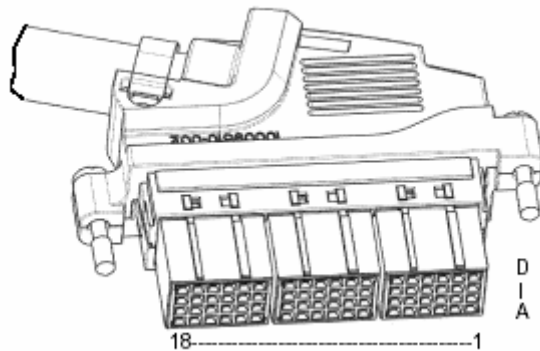



fig.16

### 4.6.2 Product identification

Covers:  
Marked with FCI cover product number.

Shroud:  
Marked with FCI shroud product number.

Terminal block:  
Marked with FCI product number, year and week code.

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 86 of 105	REVISION G
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### 4.6.3 Specification key

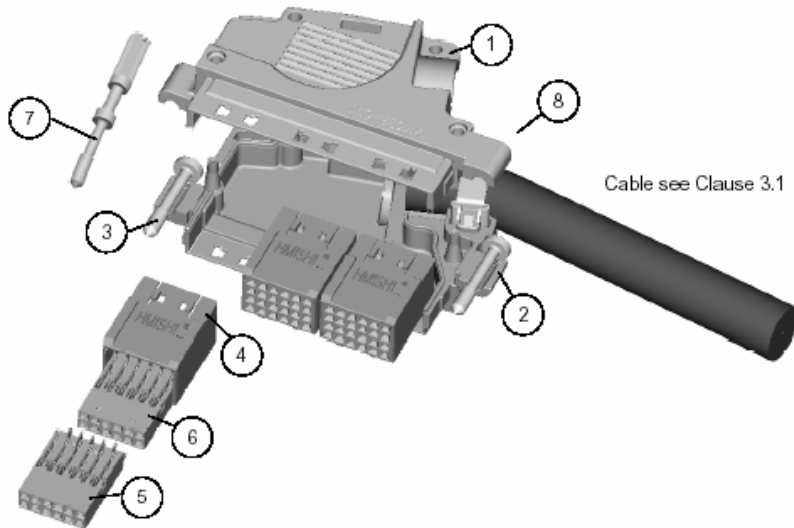

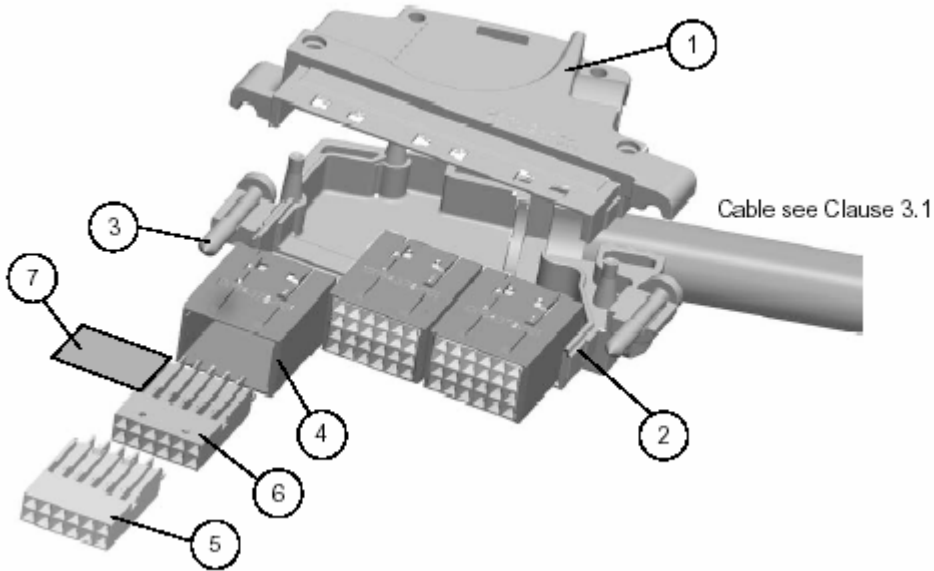



fig.17

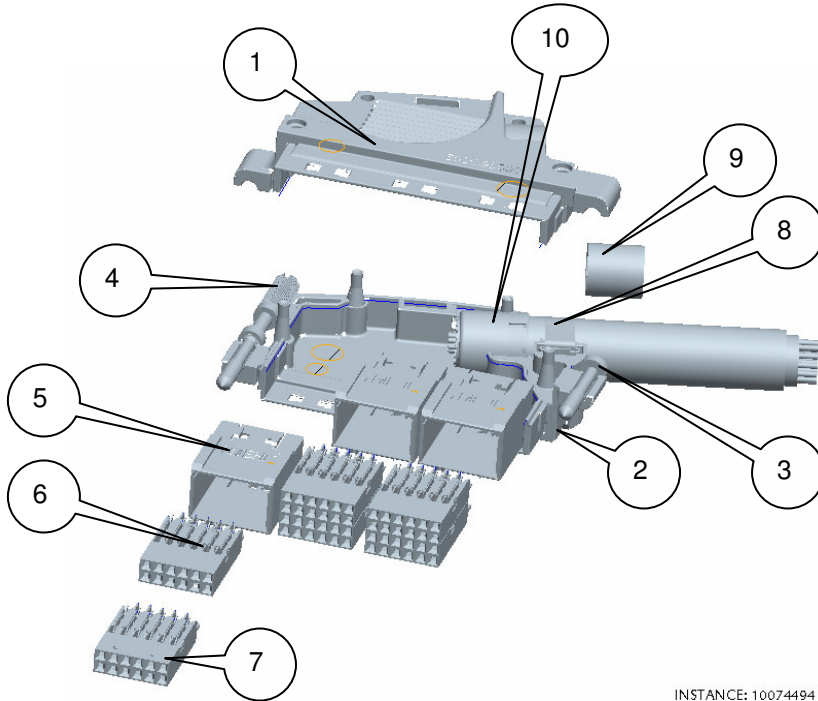
Pos	Product name	Product number	10013881-x01LF	10013881-x31LF
1	Upper cover	1009611-001LF	1	1
2	Lower cover (with integrated rivets)	10009610-002LF	1	1
3	Screw	72780-001LF	2	1
7	Thumb screw	10051684-001SLF		1
4	shroud	HM1SH1BLF	3	3
5	Terminal block	HM1C16D20L10EBLF	3	3
6	Terminal block	HM1C16D20R10EBLF	3	3
	Tie wrap(not shown)	Type: Panduit MLT-CP304	1	1

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 87 of 105	REVISION G
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Pos	Product name	Product number	RNV 603 1343/03 (10054379-x01LF)
1	Upper cover	10009611-001LF	1
2	Lower cover (with integrated rivets)	10009610-002LF	1
3	Screw	72780-001LF	2
4	Shroud	1005478-001LF	3
5	Terminal block	HM1C16D20L10EBLF	3
6	Terminal block	HM1C16D20R10EBLF	3
7	Kapton tape	MPP 123 22/1	3
	Tie wrap (not shown)	Type:Panduit MLT1S-CP304	1


NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 88 of 105	REVISION G
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INSTANCE: 10074494 C

Pos	Product name	Product number	<b>10074494-x31LF</b>
1	Upper cover	10009611-001LF	1
2	Lower cover (with integrated rivets)	10009610-002LF	1
3	Screw	72780-001LF	2
4	Thumb Screw	1005478-001LF	3
5	Shroud	HM1SH1BLF	3
6	Terminal block	HM1C16D20L10EBLF	3
7	Terminal block	HM1C16D20R10EBLF	3
8	Tie wrap	HPTE1637C	1
9	Inner ferule	10063775-001LF	1
10	Outer ferule	10063776-001LF	1




NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 89 of 105	REVISION G
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#### 4.6.4 Product list


Available products.

Product Number	Designed for cable
10013881-x01LF 10013881-x31LF 10054379-x01LF	Conductor dia0.4, Outer dia maximum .65mm, AWG 26
10074494-xx1LF	Conductor dia0.4, Outer dia 0.65 maximum . AWG 26 Overall diameter 9.4+/-10% Outer foil diameter 7+/-10%

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 90 of 105	REVISION G
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## 4.7 References

IEC 68-1	Environmental testing, Part 1: General and guidance.
IEC 68-2	Environmental testing, Part 2:Tests.
IEC 512	Electromechanical components for electronic equipment; basic testing procedures and measuring methods.
IEC 50/B/WG6	Flowing mixed gas corrosion test: Test Ke.
ETX 1056-104	Type testing program and demands for electrical connectors.
GS-12-307	Product specification.  Generic Product specification of 4X6 Signal
UL 1950	Standard for safety of information technology equipment, 3rd edition.
IEC 48B/61076-4-104Ed1	

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 91 of 105	REVISION G
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## 5.PART D-POWER CABLE CONNECTOR

### 5.1 General

#### 5.1.1 General information

This document is describing a metric round cable connector module for power distribution, hot insertion. Basic grid is 0,5 mm.

The minimum PCB spacing is 20 mm.

The specification is as well valid for the Lead Free/RoHS compatible products


#### 5.1.2 Ratings and characteristics

**Table 1:**

Rated voltage	130V r.m.s sinus (contact/contact)min.
Current rating	As per 3.4.3
Insulation resistance	5000MΩ min.
Cable (round) ( 2 conductor cable)	Conductor section: 2.5mm <sup>2</sup> Conductor diameter: 2mm Overall diameter Ø8.0mm

#### 5.1.3 Performance level

PERFORMANCE LEVEL	
XXXXX-1xxLF	<b>Telcordia CO</b>
XXXXX-XxxLF	<b>Customer Special</b>

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 92 of 105	REVISION G
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## 5.2 Dimensions and material

### 5.2.1 Connector dimensions

#### - 72824-x01LF

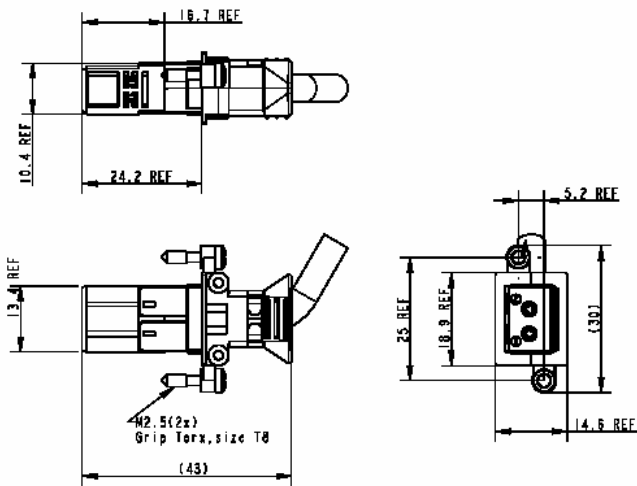


fig.1

#### - 72824-x02LF

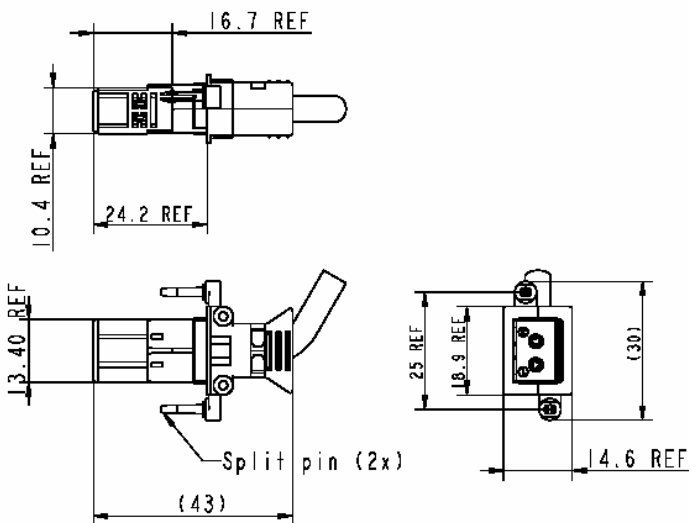



fig.2

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 93 of 105	REVISION G
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## 5.2.2 Material

Approved material for housing is Polybutylene Terephthalate (PBT, Grey, 30 % GF).  
Flammability class UL94V-0.

Total cover weight in product 72824-x01LF is 0,0125 kg.  
Total polymer weight in product 72824-x01LF is 0,0016 kg.  
Total weight of product 72824-x01LF is 0,0185 kg.

Total cover weight in product 72824-x02LF is 0,0125 kg.  
Total polymer weight in product 72824-x02LF is 0,0016 kg.  
Total weight of product 72824-x02LF is 0,0183 kg.

## 5.2.3 Housing dimension

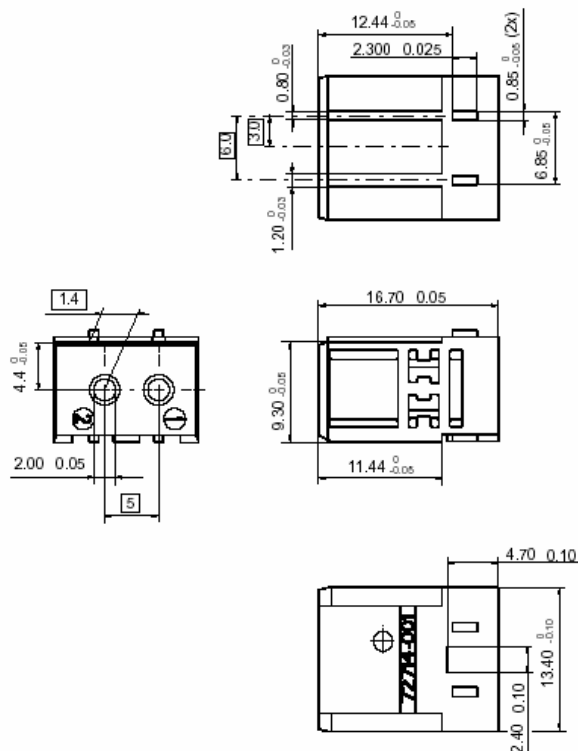



fig.3

NUMBER <b>GS-12-308</b>	TYPE <b>PRODUCT SPECIFICATION</b>		
TITLE <b>Metral Sofix®</b> P/N: 72861-x01LF 72862-x01LF 53389-x01LF 10008166-x01LF HM1C16D2J110EBLF 72817-xxxLF 10003881-xx1LF 72824-x01LF/x02LF 10054379-x01LF 10074494-x01LF/x31LF		PAGE 94 of 105	REVISION G
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## 5.2.4 Contact dimensions, surface coating and material

### 5.2.4.1 Contact surface

The contact surface is specified in figure 4. The specified values must be fulfilled at the whole specified area.

#### 5.2.4.1.1 Surface coating

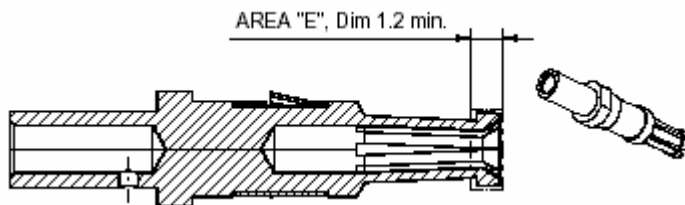


fig.4

The whole terminal is gold plated

#### 5.2.4.2 Covers

All surfaces on covers plated according to below:

1. Cu 3 µm min.
2. Ni 2 µm min.
3. Sn 6 µm min.


#### 5.2.4.3 Material

Approved material for covers is zinc alloy.  
Approved material for terminal is copper alloy.

## 5.2.5 Mounting information

### 5.2.5.1 Application tools

See document GS-20-053.

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## 5.3 Characteristics

### 5.3.1 General

All characteristics refer to 72824-x0xLF and 72846-x0xLF (mated pair of connectors).

### 5.3.2 Reference environment

According to IEC 68-1 clause 5.5.3.1

**Table 2:**

Temperature	15°-35°C
Rel. humidity	25%-75%
Atmospheric pressure	86-106kPa

### 5.3.3 Climate category

**Table 3:**

Storage	Max temperature	50°C
	Min. temperature	-40°C
Range of uses	Max temperature	70°C
	Min. temperature	-40°C

### 5.3.4 Electrical


#### 5.3.4.1 Creepage and clearance distances

Minimum creepage distance between contacts 1,5 mm.  
Minimum clearance distance between contacts 1,5 mm.

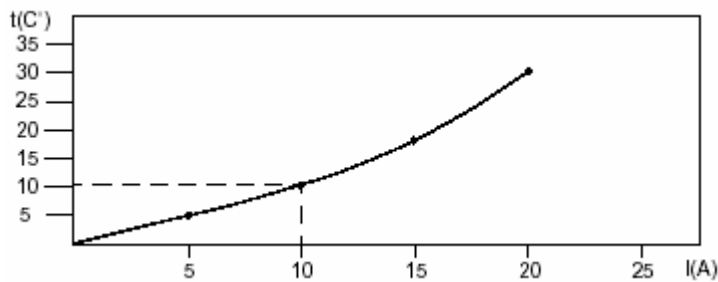
#### 5.3.4.2 Voltage proof

Initial voltage proof 1000 V r.m.s sinus min.  
Voltage proof 1000 V r.m.s sinus min. after damp heat steady state test.

Conditions:  
ETX 1056-104 clause 4.3.2.

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### 5.3.4.3 Current carrying capacity



Arrangement according to figure 5 in clause 5.4.2.

### 5.3.4.4 Current closing capacity

Approximately 1000A in 30 operations acc.to test described in clause 5.4.2.1.

The connector shall perform current carrying capacity and contact resistance after conditions as specified. Discolouring and damage of some of the contacts are allowed provided that the connector have redundant contact points.

### 5.3.4.5 Contact resistance

The increase of the contact resistance must not be more than 5 mΩ after heat ageing. The total contact resistance after heat ageing must not exceed 10 mΩ.


Conditions:  
ETX 1056-104, clause 4.2.1.

### 5.3.4.6 Insulation resistance

Initial insulation resistance 5000 MΩ minimum.  
Insulation resistance 1000 MΩ minimum, after damp heat steady state test.

Conditions:  
ETX 1056-104, clause 4.3.1.



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### 5.3.4.7 Contact resistance, crimp

Initial contact resistance 0,195 mΩ max.

The increase of contact resistance, for each separate measurement value, during the whole test sequence, may be a maximum of twice the median value of the original measurement series before the climatic test.

However a maximum of 2 % of the measurement values may lay outside this value.

Conditions:

ETX 1056-104, clause 4.2.1.

Min. 50 readings.

### 5.3.5 Mechanical

#### 5.3.5.1 Mechanical operation

##### - 72824-x01LF

Number of operations: 200 minimum.

Conditions:

IEC 512-5, test 9a.

Standard atmospheric conditions.

Frequency of operations: 100 cycles/h.

Speed of operation: 10mm/s maximum.

Rest: 30s unmated.

##### - 72824-x02LF

Number of operations: 50 maximum in accordance with test report **R07-029**.

Conditions:


IEC 512-5, test 9a.

Standard atmospheric conditions.

Frequency of operations: 100 cycles/h.

Speed of operation: 10mm/s maximum.

Rest: 30s unmated.

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### 5.3.5.2 Insertion and withdrawal forces

#### - 72824-x01LF

Total contact insertion/withdrawal force: n x10 N max  
(n= number of contacts involved).

Conditions:

IEC 512-7, test 13b.

Rate of engagement and separation: 2mm/s maximum.

#### - 72824-x02LF

Total contact insertion/withdrawal force: n x10 N max  
(n= number of contacts involved).

Conditions:

IEC 512-7, test 13b.

Rate of engagement and separation: 2mm/s maximum.

Split pin insertion force  $\leq$  65 N

Split pin withdrawal force  $\geq$  20 N

### 5.3.5.3 Contact retention in insert

Force to be applied: 15 N/contact.

Conditions:

IEC 512-8 test 15a.

Standard atmospheric conditions.

The maximum axial displacement after the force has been removed shall not exceed 0,1 mm.

2 readings per connector.

### 5.3.5.4 Contact force

#### 5.3.5.4.1 Contact spring force


Initial contact spring force 1,0 N min.

Contact spring force 1,0 N min., after 200 mechanical operations.

Contact spring force 0,8 N min., after heat ageing.

Conditions:

ETX 1056-104 clause 4.6.2.

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#### 5.3.5.4.2 Pulling force

Pulling force crimp section cable, power sleeve: 375 N minimum.

Conditions:

Standard atmospheric conditions.

Arrangement according to fig.7 in clause 5.4.4.

#### 5.3.5.4.3 Pull test of the cable

Power sleeve: 100 N minimum.

Conditions:

ETX 1056-104 clause 5.2.3.


Standard atmospheric conditions.

During the pull test, the connector shall be mounted in housings with connected cable as specified in clause 5.2.5.1.

Arrangement according to fig.8 in clause 5.4.5.

#### 5.3.6 Product safety

Requirements according to IEC 950 and UL 1950.

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## 5.4 Testing

### 5.4.1 General

The connector shall undergo the testing schedule described in ETX 1056-104. This testing is a type testing and an approval will be a result of a judging procedure depending of the result of the testing. The manufacturing process and/or the vendors internal specification may not be changed after type testing and approval without permission from design responsible.

### 5.4.2 Current closing capacity

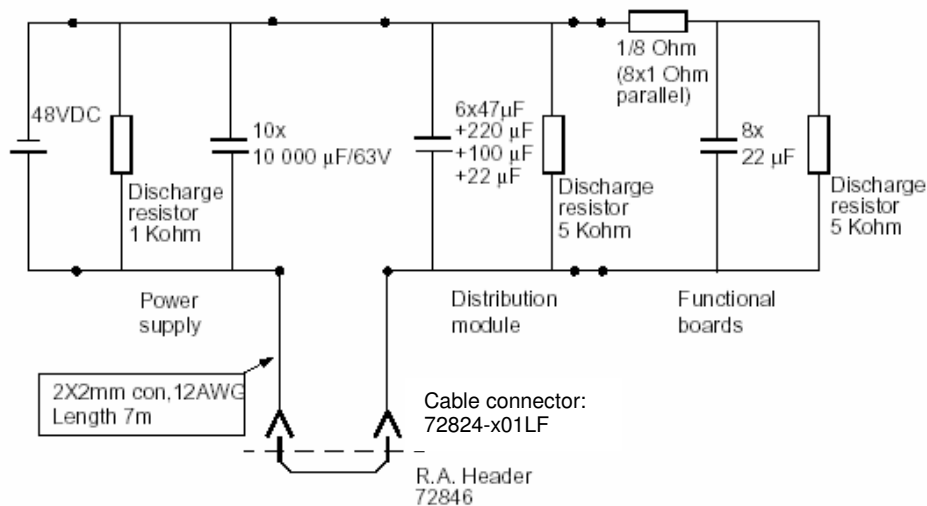
#### 5.4.2.1 Connection

3 connectors to be mated 30 cycles (test circuit acc. to fig.5).  
Visual inspection of all connectors:

Mixed flowing gas corrosion test acc. to IEC 68-2-60, test Ke, method 4,4 gases.

Measuring of contact resistance of all samples  
(dry circuit, 20mV, 100mA)

Measuring of current carrying capacity all samples.  
Test circuit for simulation of current transient with connection during load (capacitance charging).




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fig.5

### 5.4.2.2 Connect position

- 3 connectors, 50 times.
- Visual inspection of all connectors.
- Corrosion test (21 days, gas mixture).
- Continue measuring with 1 connector.
- Measuring of contact resistance see clause 5.4.2.1.
- Measuring of current carrying capacity see clause 5.4.2.1.

Test circuit for simulation of current transient with short-cut.

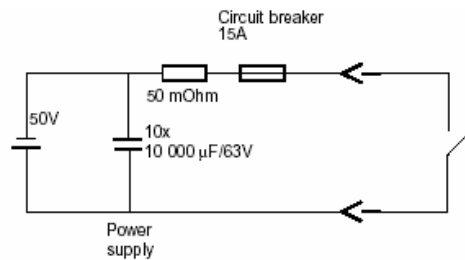


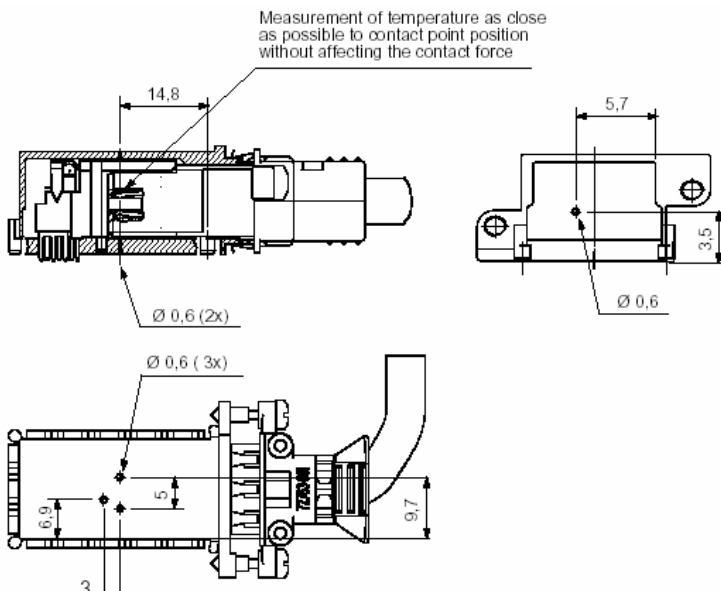
fig.6

### 5.4.3 Current carrying capacity

For conditions see clause 5.3.4.3.

72846LF is soldered to PCB.


Arrangement for measurement according to fig.7.



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Form E-3334  
Rev F

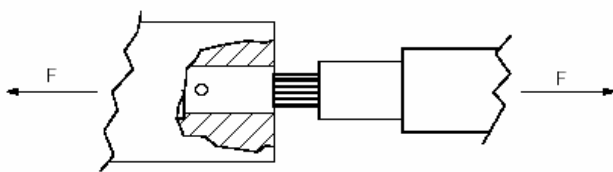
GS-01-001

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#### 5.4.4 Pulling force

For conditions see clause 5.3.5.4.2.

Arrangement for measurement according to fig 8.



F=375 N minimum.

#### 5.4.5 Pull test of the cable

For conditions see clause 5.3.5.4.3.

Arrangement for measurement according to fig 9.

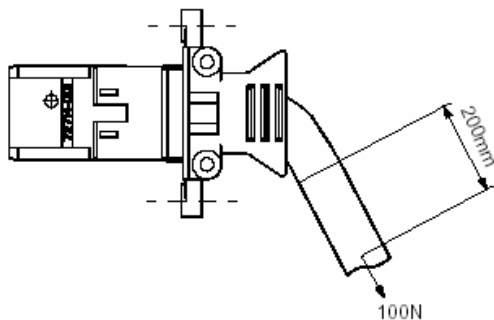


fig.9


### 5.5 Packing

#### 5.5.1 Packing for transport

Packing shall be made so that:

- a no damage or deformation of the terminals will occur
- b no particles or parts from the packing will enter into the contacts cavities and no gases or acids from packing materials will harm the housing or the contact elements
- c the connectors can be removed without problems from the packing without touching the terminals or deforming them

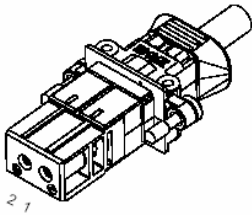
The packing shall be marked with product number, manufacturer code and packing date.

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## 5.6 Product number

### 5.6.1 Contact arrangement

fig.10



### 5.6.2 Product identification

Covers: Marked with product number and company logo.

Housing: Marked with product number, batch number and factory code

### 5.6.3 Specification key

**72824-x01LF**

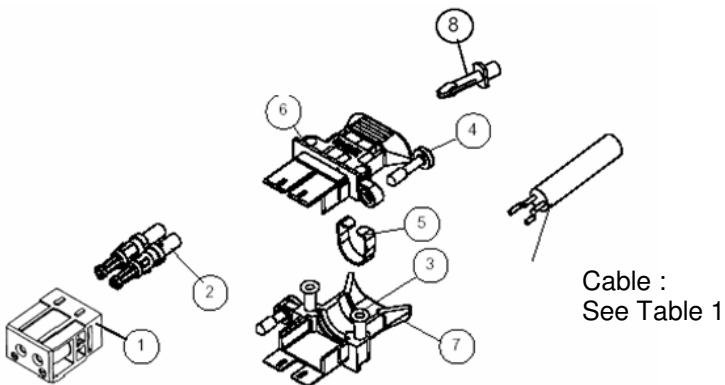



fig.11

**Table 7:**

Pos	Product name	72824-201LF	72824-202LF
1	Housing	1	1
2	Contact sleeve	2	2
3	Tubular rivet	2	2
4	Screw	2	0
5	Clamp	1	1
6	Cover half	1	1
7	Cover half	1	1
8	Split pin	0	2

### 5.6.4 Product number list


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Available products

## 5.7References

IEC 68-1	Environmental testing, Part 1:General and guidance.
IEC 68-2	Environmental testing, Part 2: Tests.
IEC 512	Electromechanical components for electronic equipment; basic testing procedures and measuring methods.
ETX 1056-104	Type testing program and demands for electrical connectors.
GS-20-050	Application Specification
UL-94V0	Safety standard
R07-029	Mating test report



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## 6. Document revision information

REV	PAGE	DESCRIPTION	EC #	DATE
A	ALL	NEW DOCUMENT	LS05-0014	05-01-2005
B	ALL	NEW LOGO	LS06-0109	04-07-2006
C	ALL 81 82	Add LF products and RoHS information Add P/n 10013881-231LF Add P/n 10054379-001LF	LS06-0127	21/08/2006
D	84-85-86 95	Update cable data on table 1 Change "see table 8" on fig 10 Add new version 10074494-231LF	LS07-0044	14/02/2007
E	ALL	New Frame	LS07-0129	2007/06/08
F	ALL	Add Performance level		2008/01/28
G	87	Correct wrong part no. 10009611-001LF	N09-0225	2009/07/22