



Q17004

# BULKHEAD RECEPTACLE + 90° PLUG VALIDATION PLAN ACCORDING TO EN50467

*FXP size2 90°*

PRJ-17-000901935

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# Validation / Qualification Test Report



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# 1 INTRODUCTION

## 1.1 AIM OF THE TESTS

The aim of the type tests is to qualify the connector FXP2 – 90° according to the standard EN50467. The FXP series is designed to fulfil the standard EN50467 and consequently section 7 of this standard which defined the type tests, specimens, sequence, ratings and measurements to be performed by the product in tests.

Unless otherwise specified, severity of the service conditions shall be those per EN50467, table B.1, for on board rolling stock locations 4-5-6.

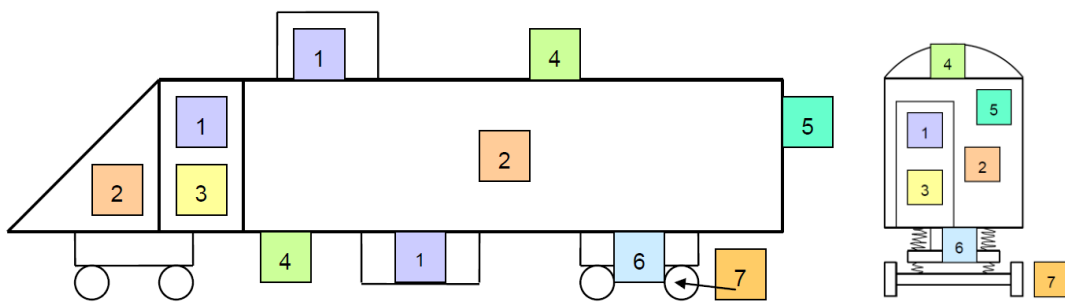


Figure 1 – Typical connector locations on board rolling stock (EN50467, fig. 3)



## 1.2 APPLICABLE DOCUMENTS

### 1.2.1 TE Connectivity documents

#### Connectors:

- 212735\_DEUTSCH - Female bulkhead receptacle for contacts to be screwed cal.20
- 212777\_DEUTSCH - Male 90° plug for contacts to be crimped cal.20
- 114-157007 - Implementation and wiring procedure of FXP2 range
- 108-157008 - FXP size 2, 90° plug + bulkhead receptacle, Product Specification
- 502-157057 - FXP series EN45545-2 Compliance report
- 409-157000 - FXP series Maintenance Manual

#### Contacts:

- 212739\_DEUTSCH - S/A female contact cal.20, connection for lug M10, M12 and M14
- 212836\_DEUTSCH - S/A male 90° contact cal.20 to be crimped 50 to 240mm<sup>2</sup>

#### Other / Download documents:

- <http://www.te.com/>

### 1.2.2 Normative documents

The following referenced standards are applicable, as well as the standards listed therein as applicable standards. For undated references, the last standard version in effect at the test date has been used.

- EN 45545-2+A1:2016 – Railway applications – Fire protection on railway vehicles – Part 2: Requirements for fire behavior of materials and components
- EN 50467:2012 - Railway applications – Rolling stock – Electrical connectors, requirements and test methods
- EN 50124-1/A2:2005 - Railway applications – Insulation coordination – Part 1: Basic requirements – Clearances and creepage distances for all electrical and electronic equipment
- EN 60068-1:2014 - Environmental testing – part 1: general guidance
- EN 60068-2-1:2007 - Environmental testing – Part 2-1: Tests – Test A: Cold
- EN 60068-2-2:2007 - Environmental testing – Part 2-2: Tests – Test B: Dry heat
- EN 60068-2-11:1999 - Environmental testing – Part 2: Tests – Test Ka: Salt mist
- EN 60512-1:2001 - Connectors for electronic equipment – Tests and measurements – Part 1: General
- EN 60512-1-1:2002 - Connectors for electronic equipment – Tests and measurements – Part 1-1: General examination – Test 1a: Visual examination
- EN 60512-1-2:2002 - Connectors for electronic equipment – Tests and measurements – Part 1-2: General examination – Test 1b: Examination of dimension and mass
- EN 60512-2-1:2002 - Connectors for electronic equipment – Tests and measurements – Part 2-1: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method
- EN 60512-2-2:2003 - Connectors for electronic equipment – Tests and measurements – Part 2-2: Electrical continuity and contact resistance tests – Test 2b: Contact resistance – Specified test current method

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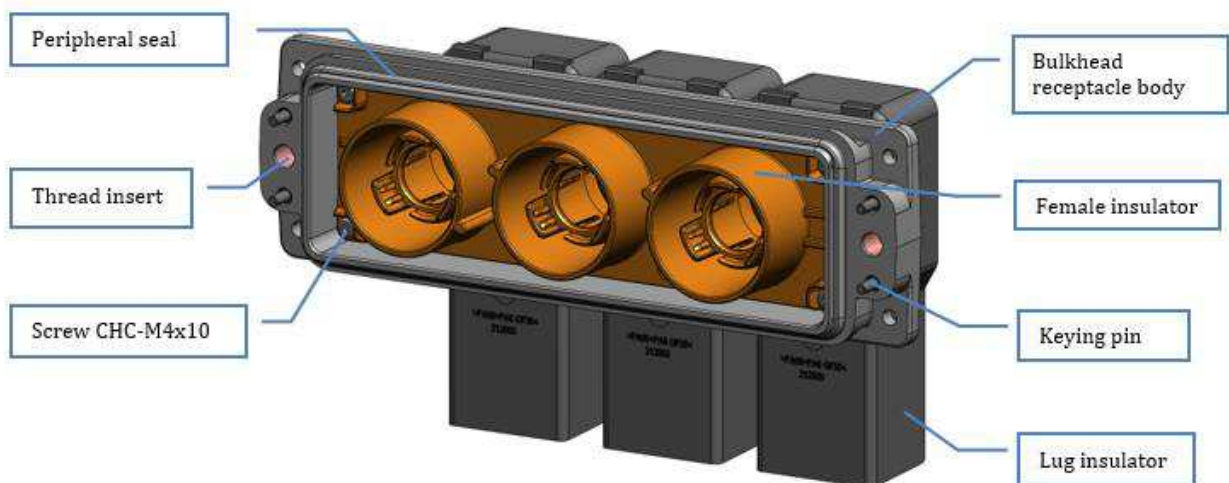
- EN 60512-2-5:2003 - Connectors for electronic equipment – Tests and measurements – Part 2-5: Electrical continuity and contact resistance tests – Test 2e: Contact disturbance
  - EN 60512-3-1:2002 – Connectors for electronic equipment – Tests and measurements – Part 3-1: Insulation tests – Test 3a: Insulation resistance
  - EN 60512-4-1:2003 - Connectors for electronic equipment – Tests and measurements – Part 4-1: Voltage stress tests – Test 4a: Voltage proof
  - EN 60512-5-1:2002 – Connectors for electronic equipment – Tests and measurements – Part 5-1: Current-carrying capacity tests – Test 5a: Temperature rise
  - EN 60512-7-2:2012 - Connectors for electronic equipment – Tests and measurements – Part 7-2: Impact tests (free connectors) – Test 7b: Mechanical strength impact
  - EN 60512-9-1:2010 - Connectors for electronic equipment – Tests and measurements – Part 9-1: Endurance tests – Test 9a: Mechanical operation
  - EN 60512-11-6:2002 - Connectors for electronic equipment – Tests and measurements – Part 11-6: Climatic tests – Test 11f: Corrosion, salt mist
  - EN 60512-11-9:2002 - Connectors for electronic equipment – Tests and measurements – Part 11-9: Climatic tests – Test 11i: Dry heat
  - EN 60512-11-10:2002 - Connectors for electronic equipment – Tests and measurements – Part 11-10: Climatic tests – Test 11j: Cold
  - EN 60512-13-1:2006 - Connectors for electronic equipment – Tests and measurements – Part 13-1: Mechanical operation tests – Test 13a: Engaging and separating force
  - EN 60512-13-5:2006 - Connectors for electronic equipment – Tests and measurements – Part 13-5: Mechanical operation tests – Test 13e: Polarizing and keying method
  - EN 60512-15-1:2008 - Connectors for electronic equipment – Tests and measurements – Part 15-1: Connector tests (mechanical) – Test 15a: Contact retention in insert
  - EN 60512-15-2:2008 - Connectors for electronic equipment – Tests and measurements – Part 15-2: Connector tests (mechanical) – Test 15b: Insert retention in housing (axial)
  - NFF 00-363:1995 – Rolling stock – Products to be crimped for electrical connections
  - EN 60529:1991+A1:2000 – Degree of protection procured by enclosures (IP code)
  - EN 61373:1999 – Railway applications – Rolling stock equipment – Shock and vibrations tests
  - ISO 1431-1:2004 – Rubber, vulcanized or thermoplastic – Resistance to ozone cracking – Part 1: Static and dynamic strain testing
- Assembly drawings ([see appendix 1](#)):
- 212735\_DEUTSCH: Female bulkhead receptacle for contacts to be screwed cal. 20
  - 212777\_DEUTSCH: Male 90° plug cal. 20
  - 212739\_DEUTSCH: S/A female contact cal. 20, connection for lug M12 and M14
  - 212836\_DEUTSCH: S/A male contacts cal. 20 90° to be crimped 50 to 240 mm<sup>2</sup>

### 1.3 SAMPLING

Sample No.	Reference	Quantity per sample	Description	Drawing
1 to 12	FXP2WS-3XXX-S	1	FEMALE BULKHEAD RECEPTACLE	212735_DEUTSCH
	FXP2PA-3M40-P	1	MALE 90° PLUG	212777_DEUTSCH
	FXP-CS20-LM14S-CU	3	FEMALE CONTACT	212739_DEUTSCH
	FXP-CA20-M240P-CU	3	MALE CONTACT 90°	212836_DEUTSCH
	0401-0391AS	3	CABLE GLAND	/
	0151-0252AS	3	LUGS 240 MM <sup>2</sup>	/
	HM14x40-I	3	H HEAD SCREW M14X40	/
	MU-14-I	3	FLAT WASHER M14	/
	3L14-I	3	TREP WASHER M14	/

The connectors under test are shown below:

FXP size 2 - Bulkhead receptacle:

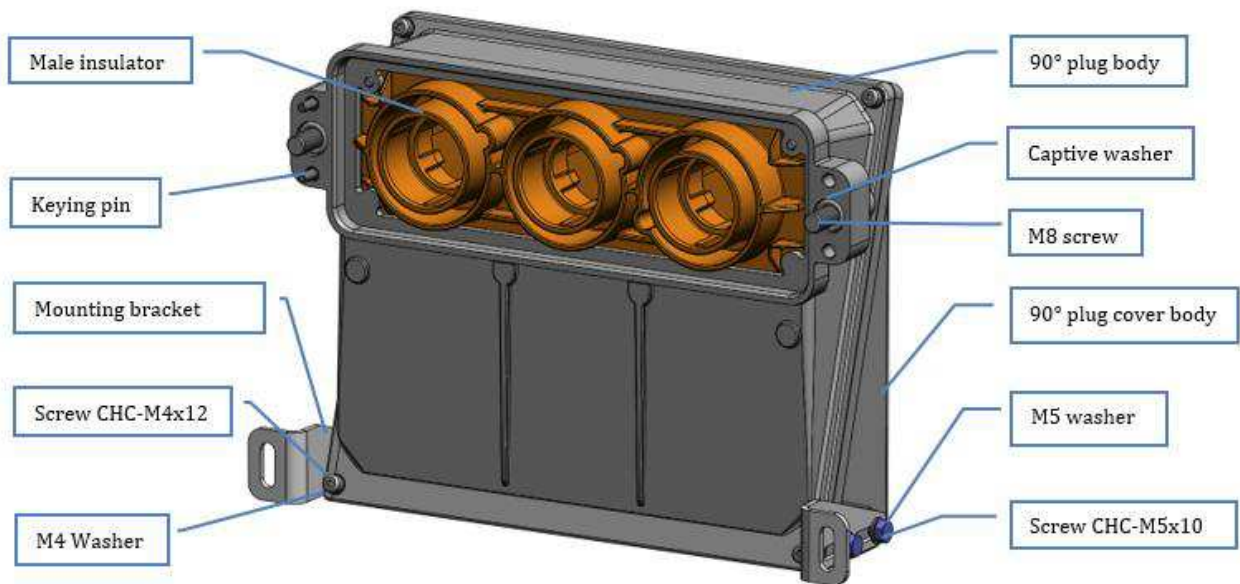




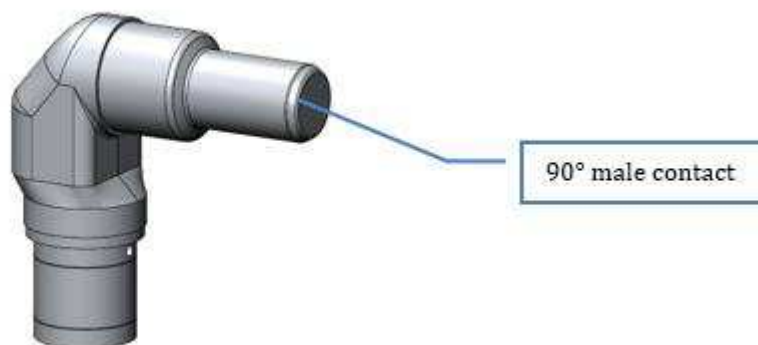
FXP size 2 – Female contact for receptacle:



FXP size 2 - 90° plug:



FXP size 2 – 90° male contact for plug:



The straight contacts are assembled in the insulators, receptacle side, by clips and the 90° contact, 90° plug side, are enclosed inside the plug.

The link between the male and female contacts is done with a diabolo (spring lamellas technology).

The cross section of termination chooses for the qualification is the big size (240 mm<sup>2</sup>).



## 1.4 TESTS SEQUENCE

The samples are submitted to the tests in the table here-after:

Group		Test description	EN 60512	EN 50467	Sample number
0	01	Visual & dimensional examination	1a,1b		2 to 12
	02	Conformity of marking	1a		Each sample
	03	Contact resistance	2b		1, 5 and 7 to12
	04	Insulation resistance	3a		Each sample
	05	Dielectric strength	4a		Each sample
A	A1	Visual & dimensional examination	1a, 1b		1
	A3	Polarization	13e, 1a		
	A6	Contact retention in insert	15a, 1a		
	A8	Mechanical strength impact	7b, 1a		
B	B1	Initial measurement	2b		2 to 4
	B2	Mechanical operation	9a, 1a	7.9	
	B3	Final measurement	2b, 4a	7.12	
C	C1	Temperature rise	5a	7.8	5
D	D1	Initial measurement	2b		6
	D2	Cold	11j, 1a	6.18	
	D3	Dry heat	11i, 1a	6.18	
	D4	Salt mist test	11f, 1a	7.14	
	D5	Final measurement	2b		
	D6	Dielectric strength	4a	7.12	
E	E3	Degree of protection IP code		7.7	7 to 8
	E4	Dielectric strength	4a	7.12	
F	F1	Simulated long life random vibration at increased levels	2e, 1a	EN61373	9
	F2	Shock	1a	EN61373	
	F3	Random vibration test	2e, 1a	EN61373	
	F4	Dielectric strength	4a	7.12	
G	G1	Fluid resistance	19c		10 to 12
	G2	Engaging and separating force	13a		
	G3	Contact resistance	2b		
	G4	Insulation resistance	3a		
	G5	Dielectric strength	4a	7.12	
	G6	Contact retention in insert	15a		
	G7	Insert retention in housing (axial)	15b		
	G8	Visual examination	1a		
		Fire behavior of materials and components		6.22	
		Resistance to ozone		6.24	



## 1.5 SAMPLES IMPLEMENTATION

For each test, except particular conditions:

- Preconditioning of the samples at least 24 hours, at  $(23 \pm 5)$  °C and at 45% to 75% of HR
- Samples are completely assembled according to manufacturer's specifications

Each sample for testing is composed of a pair of connectors: a plug and a receptacle, equipped of contacts and cable glands.



Products are prepared and wired according to the application specifications below:

- 114-157007: Implementation and wiring procedure of FXP2 range

The cable and crimping tools used are:

Cable section	Cable designation	CRIMPING TOOL			
		Pump	Cylinders	Flexible	Dies
240 mm <sup>2</sup>	OMERIN 369 EN50382-2 3600V 1X240 F 120°C – 1701748 – 15/2017	PA133K	SU210K	F4622K	TN 240V20

## 1.6 SAMPLES WORKING ORDERS

WO No.	DESCRIPTION	CATALOGUE No.
200216600932	PRESSE ETOUPE M40 – 22 A 32MM NICKELE	STD0401-0391AS
200216847099	CONTACT FEMALE CAL.20, M14 - FXP	FXP-CS20-LM14S-CU
200216926335	PLUG MALE ANG.90 CAL.20 - FXP	FXP2PA-3M40-P
200216927408	RECEPTACLE FEMALE BULKHEAD - FXP	FXP2WS-3XXX-S
200216957548	CONTACT FEMALE CAL.20, M14 - FXP	FXP-CS20-LM14S-CU
200216973710	CONTACT MALE ANG.90, CAL.20, 240MM2 - FXP	FXP-CA20-M240P-CU



## 1.7 TESTS DEVICES

Description	TE No.	Calibration dates	
		Current	Next
Caliper MITUTOYO	6131	2017/10	2018/10
Caliper MAHR	5143	2017/10	2018/10
Comparator MAHR	5483	2017/06	2018/06
3D OGP	6616	2017/11	2018/11
Buffer P M14x2.0 5H	0443	2017/09	2019/09
Buffer P/NP M40x1.5 – 6H	5504	2016/06	2018/06
Scale PCM BE6001	6689	2018/01	2019/01
Traction / compression machine ADAMEL LHOMARGY DY36	1118	2017/04	2019/04
Ohmmeter MEGGER DLRO600	6701	2018/03	2019/03
Insulation tester MEGGER BM25	2231	2017/11	2018/11
Dielectric strength tester SEFELEC PR 12 PF	1589	2017/03	2018/03
Comparator Mitutoyo	6626	2017/06	2018/06
Dynamometric key FACOM	7604	2017/11	2019/11
Datalogger AGILENT 34970A	1868	2017/03	2018/03
Current generator ZENONE model GI2000GL	7054	2017/06	2018/06
AC current probe CHAUVIN ARNOUX MA100	7570	2017/03	2018/03
Climatic chamber CLIMATS 320H60-1-5	1574	2017/06	2018/06
Salt spray chamber DYCOMETAL type SSC-400	7574	2017/05	2018/05
Shower + Flowmeter PIUISI instrument (indicator)	/	/	/
Micro-cuts detection device	7344-0001-03-002	2017/10	2018/10
Driver station	7161-0001-05-002	2017/11	2018/11
Sensor signal conditioner model 488C series	7161-0001-26-001	2016/12	2018/12
Accelerometer	7161-0001-28-001	2017/10	2018/10
Climatic chamber FRANCE ETUVES D069	6019	2017/06	2018/06
Climatic chamber FRANCE ETUVES	6225	2017/06	2018/06
Climatic chamber BINDER	6659	2015/05	2020/05

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## 2 CONCLUSION

General, Group 0 (non-normative)					Sample No.												Compliance
Test	Test description	Standard	Test ratings	Requirements	1	2	3	4	5	6	7	8	9	10	11	12	
01	Visual and dimensional examination	EN60512-1-1 EN60512-1-2	Customer drawing	Dimension shall comply with the drawings		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
02	Conformity of marking	EN50467-6.2	Customer drawing	Supplier's name, manufacture date, sample reference and contact locating numbers		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
03	Contact resistance	EN60512-2-2	600 A	CR ≤ 0.15 mΩ	✓				✓		✓	✓	✓	✓	✓	✓	✓
04	Insulation resistance	EN60512-3-1	1000 V DC 60s	IR ≥ 5 000 MΩ	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
05	Dielectric strength	EN60512-4-1	12 kV / AC 50Hz	No breakdown nor flashover	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Mechanical tests, Group A (per EN 50467, tab. 5)					Sample No.												Compliance
Test	Test description	Standard	Test ratings	Requirements	1	2	3	4	5	6	7	8	9	10	11	12	
A1	Visual and dimensional examination	EN60512-1-1 EN60512-1-2	Customer drawing	Dimension shall comply with the drawings	✓												✓
A3	Polarization	EN60512-13-5	540 N	No damage likely to impair function	✓												✓
A6	Contact retention in insert	EN60512-15-1	200 N / 10 s	No axial displacement likely to impair normal operation	✓												✓
A8	Mechanical strength impact	EN 60512-7-2	Dropping Height: 500 mm	Parts used for protection against electric shock shall not be damaged. Reduction of clearance and creepage distances is not allowed	✓												✓

Service Life Tests, Group B (per EN 50467, tab. 6)					Sample No.												Compliance
Test	Test description	Standard	Test ratings	Requirements	1	2	3	4	5	6	7	8	9	10	11	12	
B1	Initial measurement	EN60512-2-2	600 A	CR initial, reference value		✓	✓	✓									✓
B2	Mechanical operation	EN60512-9-1	500 cycles	No damage shall occur which could impair normal use		✓	✓	✓									✓
B3	Final measurement	EN60512-2-2 EN60512-4-1	600 A 12 kV / AC 50 Hz	≤ CR initial + 50% No breakdown nor flashover		✓	✓	✓									✓

Thermal Tests, Group C (per EN 50467, tab. 7)					Sample No.												Compliance
Test	Test description	Standard	Test ratings	Requirements	1	2	3	4	5	6	7	8	9	10	11	12	
C1	Temperature rise	EN60512-5-1 EN50467-7.8	50K 60K	The upper limiting temperature specified shall not be exceeded					✓								✓

Climatic Tests, Group D (per EN 50467, tab. 8)					Sample No.												Compliance
Test	Test description	Standard	Test ratings	Requirements	1	2	3	4	5	6	7	8	9	10	11	12	
D1	Initial measurement	EN60512-2-2	600 A	CR initial, reference value						✓							✓
D2	Cold	EN60512-11-10 EN50467-6.18	-55°C / 2 h	No damage shall occur which could impair normal use						✓							✓
D3	Dry heat	EN60512-11-9 EN50467-6.18	+100°C / 168 h	No damage shall occur which could impair normal use						✓							✓
D4	Salt mist test	EN60512-11-6 EN50467-7.14	500 h	No damage shall occur which could impair normal use						✓							✓
D5	Final measurement	EN60512-2-2	600 A	≤ CR initial + 50%						✓							✓
D6	Dielectric strength	EN50467-7.12 EN60512-4-1	12 kV / AC 50 Hz	No breakdown nor flashover						✓							✓

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Degree of Protection Tests, Group E (per EN 50467, tab. 9)					Sample No.												Compliance	
Test	Test description	Standard	Test ratings	Requirements	1	2	3	4	5	6	7	8	9	10	11	12		
E3	Degree of protection IP code	EN50467-7.7	Dust test	IP6X							✓	✓					✓	
			Water jet test	IPX6								✓	✓					
			Immersion 1 m / 30min	IPX7									✓	✓				
			-0.5 bar / 30min	IPX8									✓	✓				
E4	Dielectric strength	EN50467-7.12 EN60512-4-1	12 kV / AC 50 Hz	No breakdown nor flashover							✓	✓					✓	

Vibrations and Shock Tests, Group F (per EN 50467, tab. 10)					Sample No.												Compliance
Test	Test description	Standard	Test ratings	Requirements	1	2	3	4	5	6	7	8	9	10	11	12	
F1	Simulated long life random vibration at increased levels	EN61373: 1999, clause 9	Cat.2 ≤ 0.1 μs	Micro interruption ≤ 1 μs No damage likely to impair function									✓				✓
F2	Shock	EN61373: 1999, clause 10	Cat.2	No damage likely to impair function									✓				✓
F3	Random vibration test	EN61373: 1999, clause 8	Cat.2 ≤ 0.1 μs	Micro interruption ≤ 1 μs No damage likely to impair function									✓				✓
F4	Dielectric strength	EN50467-7.12 EN60512-4-1	12 kV / AC 50 Hz	No breakdown nor flashover									✓				✓

Resistance of Fluids, Group G (per EN 50467, tab. 11)					Sample No.												Compliance
Test	Test description	Standard	Test ratings	Requirements	1	2	3	4	5	6	7	8	9	10	11	12	
G1	Fluid resistance	EN60512-19-3	HCl: 23°C NaOH: 23°C IRM902 oil: 50°C Ageing: 70°C	No damage likely to impair function and maintain legible marking										✓	✓	✓	✓
G2	Engaging and separating force	EN60512-13-1	Insertion/extraction forces	No damage likely to impair function										✓	✓	✓	✓
G3	Contact resistance	EN60512-2-2	600 A	≤ CR initial + 50%										✓	✓	✓	✓
G4	Insulation resistance	EN60512-3-1	1000 V DC / 60 s	IR ≥ 500 MΩ										✓	✓	✓	✓
G5	Dielectric strength	EN50467-7.12 EN60512-4-1	12 kV / AC 50 Hz	No breakdown nor flashover										✓	✓	✓	✓
G6	Contact retention in insert	EN60512-15-1	200 N / 10 s	Axial displacement after the test ≤ 0.5 mm										✓	✓	✓	✓
G7	Insert retention in housing	EN60512-15-2	360 N / 1 min	No displacement or damage likely to impair function										✓	✓	✓	✓
G8	Mated and unmated sample	EN60512-1-1	visual	No damage likely to impair function										✓	✓	✓	✓

Tests on raw materials (per EN 50467, tab. 13)				Sample No.												Compliance	
Test description	Standard	Test ratings	Requirements	1	2	3	4	5	6	7	8	9	10	11	12		
Fire behaviour of materials and components	EN 45545-2	R22 / R23	HL2 mini														✓
Resistance to ozone	ISO 1431-1	Method B: 24h / 500 ppb / 40°C / elongation 20%	No cracks shall appear														✓

✓	Test realized and compliant result
✗	Test realized and no compliant result

The FXP size 2 connector's, bulkhead receptacle and 90° plug versions, comply with the EN50467 requirements.



### 3 APPENDICES

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APPENDIX 1: Drawings

212735\_DEUTSCH: Female bulkhead receptacle for contacts to be screwed cal.20

**COUPE B-B**

**COUPE A-A**  
View with contacts and lugs  
(not included in BOM)

**View with a lug at 90°**  
(Possibility to turn each lug with an incrementation of 90°)

REPERES	DESIGNATION	PROFIL	REMARKS
1	BOITIER	ALU 6063	
2	BOITIER	ALU 6063	
3	BOITIER	ALU 6063	
4	BOITIER	ALU 6063	
5	BOITIER	ALU 6063	
6	BOITIER	ALU 6063	
7	BOITIER	ALU 6063	
8	BOITIER	ALU 6063	
9	BOITIER	ALU 6063	
10	BOITIER	ALU 6063	
11	BOITIER	ALU 6063	
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54	BOITIER	ALU 6063	
55	BOITIER	ALU 6063	
56	BOITIER	ALU 6063	
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59	BOITIER	ALU 6063	
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97	BOITIER	ALU 6063	
98	BOITIER	ALU 6063	
99	BOITIER	ALU 6063	
100	BOITIER	ALU 6063	

Service voltage (V)	1000V	500V	400V
Over-voltage category	III	III	III
Relative degree	P21	P21	P21

Part Number	Description	Qty	Material	Notes
212735-001	BOITIER	1	ALU 6063	
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212735-003	BOITIER	1	ALU 6063	
212735-004	BOITIER	1	ALU 6063	
212735-005	BOITIER	1	ALU 6063	
212735-006	BOITIER	1	ALU 6063	
212735-007	BOITIER	1	ALU 6063	
212735-008	BOITIER	1	ALU 6063	
212735-009	BOITIER	1	ALU 6063	
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212735-011	BOITIER	1	ALU 6063	
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212735-015	BOITIER	1	ALU 6063	
212735-016	BOITIER	1	ALU 6063	
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212735-018	BOITIER	1	ALU 6063	
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212735-028	BOITIER	1	ALU 6063	
212735-029	BOITIER	1	ALU 6063	
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212735-031	BOITIER	1	ALU 6063	
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212735-037	BOITIER	1	ALU 6063	
212735-038	BOITIER	1	ALU 6063	
212735-039	BOITIER	1	ALU 6063	
212735-040	BOITIER	1	ALU 6063	
212735-041	BOITIER	1	ALU 6063	
212735-042	BOITIER	1	ALU 6063	
212735-043	BOITIER	1	ALU 6063	
212735-044	BOITIER	1	ALU 6063	
212735-045	BOITIER	1	ALU 6063	
212735-046	BOITIER	1	ALU 6063	
212735-047	BOITIER	1	ALU 6063	
212735-048	BOITIER	1	ALU 6063	
212735-049	BOITIER	1	ALU 6063	
212735-050	BOITIER	1	ALU 6063	

Validation / Qualification  
Test Report

5375 (08/13)  
501-157006  
CLASS 1- Public

212777\_DEUTSCH: Male 90° plug cal. 20

**View with brackets advanced at maximum**

**View with brackets retracted at maximum**

**COUPE A-A**  
View with contacts (not included in BOM)

**COUPE D-D**

**COUPE B-B**

REFERENCE	DESCRIPTION	QUANTITE	UNITE	REVISION	DATE	REVISION	DATE
1	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01
2	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01
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6	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01
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8	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01
9	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01
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12	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01
13	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01
14	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01
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97	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01
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100	Plaque de base	1	PCB	1	2018-05-01	1	2018-05-01

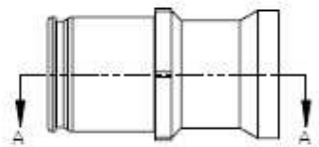
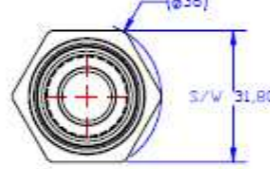


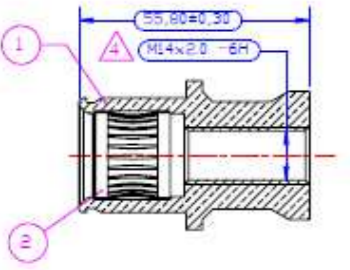
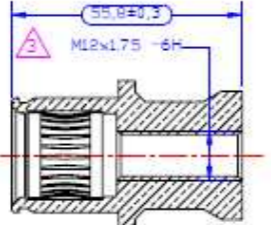
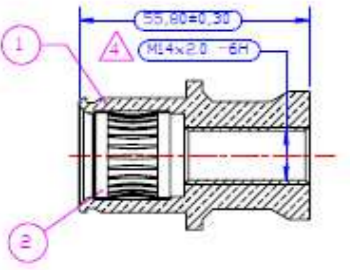
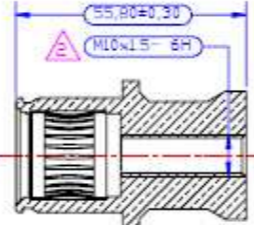


Validation / Qualification  
Test Report



CLASS 1 - Public

212739\_DEUTSCH: S/A female contact cal. 20, connection for lug M12 and M14

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<p>View A-A for commercial references FXP-CS20-LM14S-CU</p> 		<p>View A-A for commercial references FXP-CS20-LM12S-CU</p> 																																																																																																																																																																																																	
																																																																																																																																																																																																			
<p>Project NR: PRJ-17-000901935</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="5">REVISIONS</th> </tr> <tr> <th>REV</th> <th>DATE</th> <th>BY</th> <th>CHK</th> <th>APPV</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>21.JUL.2017</td> <td>MB</td> <td>MV</td> <td></td> </tr> <tr> <td>3</td> <td>21.JUL.2017</td> <td>MB</td> <td>MV</td> <td></td> </tr> <tr> <td>A</td> <td>20.01.2017</td> <td>JFG</td> <td>MV</td> <td></td> </tr> </tbody> </table> <p>1 ( ) : cotes pour information / dimensions for information          1 ( ) : cotes de controle / inspection dimensions</p> <p>▲ Couple de serrage sur vis casse avec 3 rondelles coniques = 20Nm          Lug screw tightening torque with 3 elements conical washer = 20Nm</p> <p>▲ Couple de serrage de la casse avec 3 rondelles coniques = 35Nm          Lug screw tightening torque with 3 elements conical washer = 35Nm</p> <p>▲ Couple de serrage de la casse avec 3 rondelles coniques = 55Nm          Lug screw tightening torque with 3 elements conical washer = 55Nm</p> <p>5 Contact avec filetage M10 à utiliser pour les coses de 25mm<sup>2</sup> à 150mm<sup>2</sup>          Contact avec filetage M12 à utiliser pour les coses de 50mm<sup>2</sup> à 165mm<sup>2</sup>          Contact avec filetage M14 à utiliser pour les coses de 25mm<sup>2</sup> à 240mm<sup>2</sup>          Contact with M10 thread to use for lug of 25mm<sup>2</sup> to 150mm<sup>2</sup>          Contact with M12 thread to use for lug of 50mm<sup>2</sup> to 165mm<sup>2</sup>          Contact with M14 thread to use for lug of 25mm<sup>2</sup> to 240mm<sup>2</sup></p> <p>6 Connexions à réaliser par le client          Connexion constituée des éléments de fixation suivants:          -Vis HM classe A2-70, lg fileté en prise recommandée: 2x Ø vis          -Rondelle élastique conique 3 éléments inox A2          -Rondelle H ou L inox A2</p> <p>Implementation of the connection provided by the customer          Connection consisting of the following fasteners:          -Screw H/M class A2-70, threaded length recommended: 2x Ø vis          -Conical elastic washer 3 elements A2 stainless steel          -Washer H or L stainless steel A2</p> <p>7 Specification d'emballage = 107-157006          Packaging spec = 107-157006</p> <p>8 Manuel client = 409-157000          Customer manual = 409-157000</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>-</td> <td>-</td> <td>-</td> <td>Plastique Plastic</td> <td>1</td> <td>1</td> <td>0206-0329AS</td> <td>Sachet déshydratant Deshydrating bag</td> <td>4</td> <td>X</td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>-</td> <td>-</td> <td>-</td> <td>Plastique Plastic</td> <td>1</td> <td>1</td> <td>Y0000000000-EMB040</td> <td>Sachet bulle 80 x 100 mm Bubble bag 80 x 100 mm</td> <td>3</td> <td>X</td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>-</td> <td>Argenture Silver plating</td> <td>FMME 2001</td> <td>Cuivre béryllium Beryllium copper</td> <td>2,4</td> <td>1</td> <td>16866-000A4</td> <td>Diabolo calibre 20 Diabolo caliber 20</td> <td>2</td> <td>X</td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>-</td> <td>Argenture Silver plating</td> <td>FMME 2003</td> <td>Cuivre Copper</td> <td>210,98</td> <td>1</td> <td>YC-KC-212738C-CC1A</td> <td>Contact femelle cal. 20 à visser M10 Female contact cal. 20, to be screwed M10</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>-</td> <td>Argenture Silver plating</td> <td>FMME 2003</td> <td>Cuivre Copper</td> <td>204,04</td> <td>1</td> <td>YC-KC-212738B-CC1A</td> <td>Contact femelle cal. 20 à visser M12 Female contact cal. 20, to be screwed M12</td> <td>1</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>-</td> <td>Argenture Silver plating</td> <td>FMME 2003</td> <td>Cuivre Copper</td> <td>195,49</td> <td>1</td> <td>YC-KC-212738A-CC1A</td> <td>Contact femelle cal. 20 à visser M14 Female contact cal. 20, to be screwed M14</td> <td>1</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Observations Remarks</td> <td>Protection Plating</td> <td>Fiche matière Data sheet</td> <td>Matière Material</td> <td>Masse (g) Weight (g)</td> <td>Nbr Qty</td> <td>Codification Part number</td> <td>Désignation Designation</td> <td>REP Item</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				REVISIONS					REV	DATE	BY	CHK	APPV	2	21.JUL.2017	MB	MV		3	21.JUL.2017	MB	MV		A	20.01.2017	JFG	MV																						-	-	-	Plastique Plastic	1	1	0206-0329AS	Sachet déshydratant Deshydrating bag	4	X	X	X										-	-	-	Plastique Plastic	1	1	Y0000000000-EMB040	Sachet bulle 80 x 100 mm Bubble bag 80 x 100 mm	3	X	X	X										-	Argenture Silver plating	FMME 2001	Cuivre béryllium Beryllium copper	2,4	1	16866-000A4	Diabolo calibre 20 Diabolo caliber 20	2	X	X	X										-	Argenture Silver plating	FMME 2003	Cuivre Copper	210,98	1	YC-KC-212738C-CC1A	Contact femelle cal. 20 à visser M10 Female contact cal. 20, to be screwed M10	1													-	Argenture Silver plating	FMME 2003	Cuivre Copper	204,04	1	YC-KC-212738B-CC1A	Contact femelle cal. 20 à visser M12 Female contact cal. 20, to be screwed M12	1				X									-	Argenture Silver plating	FMME 2003	Cuivre Copper	195,49	1	YC-KC-212738A-CC1A	Contact femelle cal. 20 à visser M14 Female contact cal. 20, to be screwed M14	1	X												Observations Remarks	Protection Plating	Fiche matière Data sheet	Matière Material	Masse (g) Weight (g)	Nbr Qty	Codification Part number	Désignation Designation	REP Item												
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3	21.JUL.2017	MB	MV																																																																																																																																																																																																
A	20.01.2017	JFG	MV																																																																																																																																																																																																
-	-	-	Plastique Plastic	1	1	0206-0329AS	Sachet déshydratant Deshydrating bag	4	X	X	X																																																																																																																																																																																								
-	-	-	Plastique Plastic	1	1	Y0000000000-EMB040	Sachet bulle 80 x 100 mm Bubble bag 80 x 100 mm	3	X	X	X																																																																																																																																																																																								
-	Argenture Silver plating	FMME 2001	Cuivre béryllium Beryllium copper	2,4	1	16866-000A4	Diabolo calibre 20 Diabolo caliber 20	2	X	X	X																																																																																																																																																																																								
-	Argenture Silver plating	FMME 2003	Cuivre Copper	210,98	1	YC-KC-212738C-CC1A	Contact femelle cal. 20 à visser M10 Female contact cal. 20, to be screwed M10	1																																																																																																																																																																																											
-	Argenture Silver plating	FMME 2003	Cuivre Copper	204,04	1	YC-KC-212738B-CC1A	Contact femelle cal. 20 à visser M12 Female contact cal. 20, to be screwed M12	1				X																																																																																																																																																																																							
-	Argenture Silver plating	FMME 2003	Cuivre Copper	195,49	1	YC-KC-212738A-CC1A	Contact femelle cal. 20 à visser M14 Female contact cal. 20, to be screwed M14	1	X																																																																																																																																																																																										
Observations Remarks	Protection Plating	Fiche matière Data sheet	Matière Material	Masse (g) Weight (g)	Nbr Qty	Codification Part number	Désignation Designation	REP Item																																																																																																																																																																																											
<p>Référence commerciale / Commercial reference : see table</p>																																																																																																																																																																																																			
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<p>PART NO</p>																																																																																																																																																																																																			
<p>TE Connectivity</p>																																																																																																																																																																																																			
<p>S/A contact femelle cal.20 à visser M12 et M14 S/A Female contact cal.20, connection for lug M12 and M14</p>																																																																																																																																																																																																			
<p>197.91 g</p>																																																																																																																																																																																																			
<p>CUSTOMER DRAWING</p>																																																																																																																																																																																																			

Commercial references	Filetage Thread	Weight (g)
FXP-CS20-LM14S-CU	14	199.89
FXP-CS20-LM12S-CU	12	208.44
FXP-CS20-LM10S-CU	10	215.38



# Validation / Qualification Test Report



CLASS 1- Public

## 212836\_DEUTSCH: S/A male contacts cal. 20 90° to be crimped 50 to 240 mm<sup>2</sup>

REF. Commerciale Commercial ref.		REP. Item	Modification Part number	Nbr Qty	Designation	Masse (g) Weight	Matière Material	Fiche matière Datasheet	Protection Plating	Observations Remarks
FXP-CA20-M50P-CU		x	YC-KG-212772A-CDIA	1	Contact mâle cal. 20 & sertir 240mm <sup>2</sup> Male contact cal. 20 to be crimped 240mm <sup>2</sup>	563,02	Cuivre Copper	FMNE 2005	Argenture Silver plating	-
FXP-CA20-M120P-CU		x	YC-KG-212772B-CDIA	1	Contact mâle cal. 20 & sertir 185mm <sup>2</sup> Male contact cal. 20 to be crimped 185mm <sup>2</sup>	586,86	Cuivre Copper	FMNE 2005	Argenture Silver plating	-
FXP-CA20-M185P-CU		x	YC-KG-212772C-CDIA	1	Contact mâle cal. 20 & sertir 150mm <sup>2</sup> Male contact cal. 20 to be crimped 150mm <sup>2</sup>	580,13	Cuivre Copper	FMNE 2005	Argenture Silver plating	-
FXP-CA20-M150P-CU		x	YC-KG-212772D-CDIA	1	Contact mâle cal. 20 & sertir 120mm <sup>2</sup> Male contact cal. 20 to be crimped 120mm <sup>2</sup>	580,01	Cuivre Copper	FMNE 2005	Argenture Silver plating	-
FXP-CA20-M95P-CU		x	YC-KG-212772E-CDIA	1	Contact mâle cal. 20 & sertir 95mm <sup>2</sup> Male contact cal. 20 to be crimped 95mm <sup>2</sup>	585,94	Cuivre Copper	FMNE 2005	Argenture Silver plating	-
FXP-CA20-M70P-CU		x	YC-KG-212772F-CDIA	1	Contact mâle cal. 20 & sertir 70mm <sup>2</sup> Male contact cal. 20 to be crimped 70mm <sup>2</sup>	581,80	Cuivre Copper	FMNE 2005	Argenture Silver plating	-
FXP-CA20-M50P-CU		x	YC-KG-212772G-CDIA	1	Contact mâle cal. 20 & sertir 50mm <sup>2</sup> Male contact cal. 20 to be crimped 50mm <sup>2</sup>	572,94	Cuivre Copper	FMNE 2005	Argenture Silver plating	-
		x	0206-03294S	1	Sachet déshydratant Dehydrating bag	1,50	Plastique Plastic	-	-	-
		x	Y000000000-EM304L	1	Sachet ZIP ZIP Bag	1,20	Plastique Plastic	-	-	-

**COUPE A-A  
A-A CUT**

1 ( ) : cotes pour information / dimensions for information  
 ( ) : cotes de contrôle / inspection dimensions

2

Sections du câble Cable cross sections	Outils de sertissage hydrauliques (Mécatraction) Hydraulic crimping tools (Mechtraction)				Outils de sertissage manuel (Mécatraction) Manual crimping tools (Mechtraction)	
	Pompe Pump	Vérins Jacks	Flexhoses Flexhoses	Matrices Dies	Pinces Clamps	Matrices Dies
50mm <sup>2</sup>		SU133K ou SU210K Chape ouverte/ Open shell		TN50V13 TN50V25 (0 crimping)	PNMCT	H1 (5-50 F) (0 crimping)
70mm <sup>2</sup>		ou / or	F 4622K Longueur/ Length 1,80 m	TN70V13 TN70V25 (0 crimping)	PNMCT	H1 (25-70 F) (0 crimping)
95mm <sup>2</sup>		VF133K ou VF210K Chape fermée/ Closed shell	ou / or	TN95V13 TN95V20 (0 crimping)		
120mm <sup>2</sup>	PA 02 K			TN120V13 TN120V20 (0 crimping)		
150mm <sup>2</sup>		SU210K Chape ouverte/ Open shell	F 4623K Longueur/ Length 2,00 m	TN150V20 (0 crimping)		Non disponible Not available
185mm <sup>2</sup>		ou / or		TN185V20 (0 crimping)		
240mm <sup>2</sup>		VF210K Chape fermée/ Closed shell		TN240V20 (0 crimping)		

3 Longueur de dénudage de la gaine du câble = L1+1mm  
 Cable stripping length = L1+1mm

4 Repère de zone de sertissage  
 Mandatory crimping area landmark

5

Commercial reference	Cross-section (mm <sup>2</sup> )	Dimensions (mm)			Weights (g)
		L1	D1	D2	
FXP-CA20-M240P-CU	240mm <sup>2</sup>	33	23	29	563,02
FXP-CA20-M185P-CU	185mm <sup>2</sup>	26	20,5	26	586,86
FXP-CA20-M150P-CU	150mm <sup>2</sup>	26	18	23	580,13
FXP-CA20-M120P-CU	120mm <sup>2</sup>	25	16,5	21	580,01
FXP-CA20-M95P-CU	95mm <sup>2</sup>	23	14,5	18,5	585,94
FXP-CA20-M70P-CU	70mm <sup>2</sup>	22	12,5	16	581,8
FXP-CA20-M50P-CU	50mm <sup>2</sup>	22	10,8	14	572,94

6 Specification de packaging : 107-157006  
 Packaging spec : 107-157006

7 Manuel client : 409-157000  
 Customer manual : 409-157000

Project NR  
PRJ-17-000901935

REVISIONS					
#	DATE	DESCRIPTION	BY	APP	REV
3	07.JUL.2017	Add brass section 50mm <sup>2</sup>	MB	MV	
4	07.OCT.2017	Add packaging spec number	MB	MV	
A	07.OCT.2017	Divulging 332490	MB	MV	

see table  
PART NO

Référence commerciale / Commercial reference : see table

THIS DRAWING IS A CONTROLLED DOCUMENT.	DATE: 14MAR2017	BY: M. BONNIN	APP: JF GALIPAUD
REVISIONS:	DATE: 14MAR2017	BY: M. BONNIN	APP: JF GALIPAUD
PROJ: 108-157010	PROJ: 108-157010	PROJ: 108-157010	PROJ: 108-157010
APP: 114-157007	APP: 114-157007	APP: 114-157007	APP: 114-157007
WEIGHT: 563.02 g	WEIGHT: 563.02 g	WEIGHT: 563.02 g	WEIGHT: 563.02 g
CUSTOMER DRAWING	CUSTOMER DRAWING	CUSTOMER DRAWING	CUSTOMER DRAWING

TE Connectivity

S/A contacts mâles cal. 20 90° & sertir 50 à 240mm<sup>2</sup>  
 S/A male contacts cal. 20 90° to be crimped 50 to 240mm<sup>2</sup>

SCALE: 1:1