



FXP1 SERIES STRAIGHT VERSION + BULKHEAD RECEPTACLE VALIDATION PLAN ACCORDING TO EN50467

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Table of Contents

1. SCOPE.....3
 1.1. Content3
 1.2. Qualification4
2. APPLICABLE DOCUMENTS5
 2.1. TE Connectivity documents5
 2.2. Normative references.....5
3. REQUIREMENTS6
 3.1. Design and Construction.....6
 3.2. Ratings.....6
 3.3. Performance and tests description7
 3.4. Tests Requirements and Procedures summary8
 3.5. Sampling.....21
 3.5.1. Samples BOM22
 3.5.2. Samples setting-up.....22
 3.6. Tests Sequence for FXP1 straight version.....23
 3.7. Tests Sequence for FXP1 semi-recessed version24
4. QUALITY ASSURANCE PROVISIONS.....25
 4.1. Qualification Testing25
 4.1.1. Specimens Selection25
 4.1.2. Test Sequence25
 4.1.3. Test Report.....25
 4.2. Requalification Testing.....25
 4.3. Acceptance25
 4.4. Quality Conformance Inspection.....25
APPENDIX.....26

1. SCOPE

1.1. Content

When tests are performed, the following specifications and standards shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

This specification defines the performance, tests and quality standards for electrical connection intended for use in railway rolling stock:

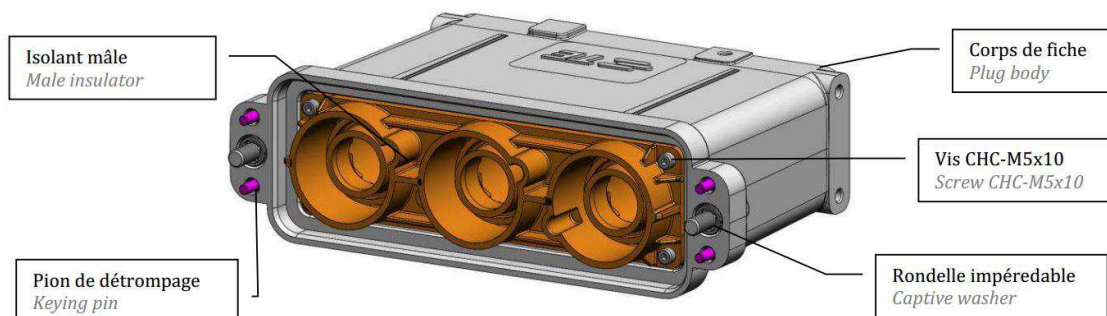
- FXP size 1 straight version, configuration 3x caliber 12 contacts to be crimped
- FXP size 1 bulkhead receptacle, configuration 3x caliber 12 contacts to be crimped

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.

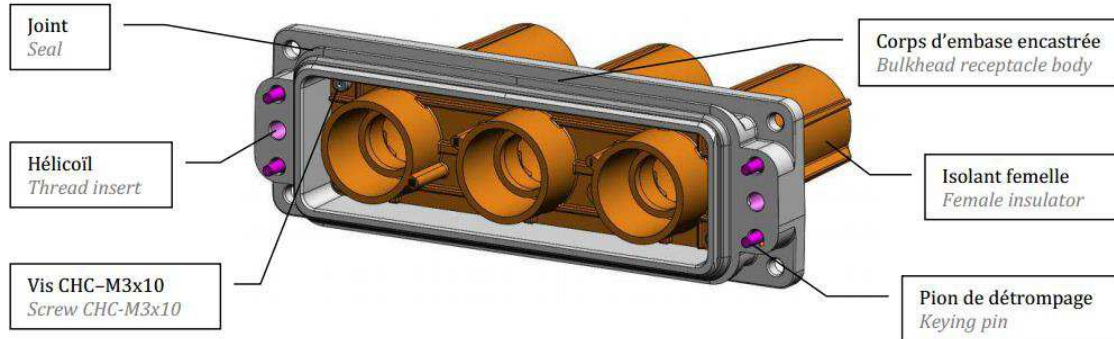
Straight Receptacle size 1 for 3 cal12 contacts:



Straight Plug size 1 for 3 cal12 contacts:



Bulkhead Receptacle size 1 for 3 cal12 contacts:



The FXP contacts caliber 12 have been already qualified (test report 501-157003). This contact range is assembled in the insulators with a circlips, the link between the male and female contacts is done with a diabololo (spring lamellas technology). The cross section of termination allows for 50mm² / 70mm² / 95mm² / 120mm²:



1.2. Qualification

When tests are performed, the following specifications and standards shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.



2. APPLICABLE DOCUMENTS

The following documents form part of this specification to the extent specified herein. In the case of a conflict between the requirements of this specification and the product drawing or of conflicts between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. TE Connectivity documents

Connectors:

- 211443_DEUTSCH - FXP1 straight receptacle, 3xM32 outlets, female insulator
- 211444_DEUTSCH - FXP1 straight plug, 3xM32 outlets, male insulator
- 211440_DEUTSCH - FXP1 Bulkhead receptacle, for contacts to be crimped, female insulator
- 114-157005 - Implementation & wiring procedure FXP1 range
- 501-157005 - FXP size 1, 3x cal12 contacts, Qualification tests report

Contacts:

- 211447_DEUTSCH – FXP series Female contacts caliber 12 to be crimped
- 211446_DEUTSCH – FXP series Male contacts caliber 12 to be crimped
- 501-157003 – FXP series contact caliber 12, Qualification tests report

Other / Download documents:

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

2.2. Normative references

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.

- EN50467:2012 – Railway Applications – Rolling Stock – Electrical connectors, requirements and test methods
- EN45545-2+A1:2016 – Railway Applications – Fire Protection on Railway Vehicles – Part 2: Requirements for fire behavior of materials and components
- EN50124-1+A2:2005 – Railway Applications – Insulation Coordination – Part 1: Basic Requirements – Clearances and creepage distances for all electrical and electronic equipment
- NFF00-363:1995 – Rolling stock – Products to be crimped for electrical connections
- EN60529:1991+A1:2000 – Degrees of Protection procured by enclosures (IP code)
- EN61373:1999 – Railway Applications – Rolling Stock Equipment – Shock & Vibrations tests



3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

3.2. Ratings

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. Testing AC voltage frequency is 50Hz.

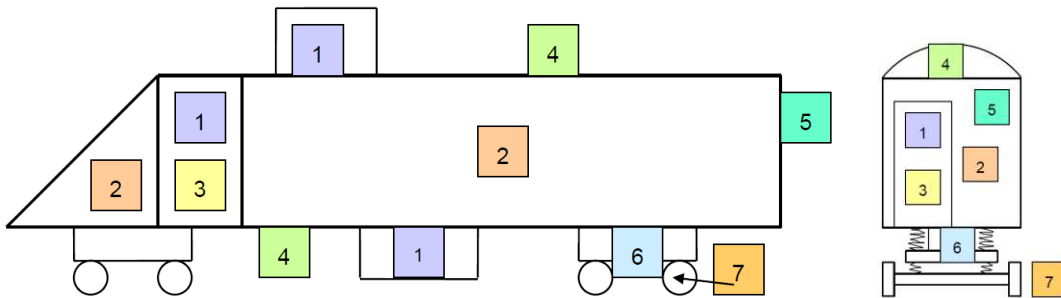


Figure 1 – Typical connector locations on board rolling stock (EN50467, fig. 3)

- Creepage and leakage distances per EN50124-1/A2

Table 1 – Insulation Coordination		
Rated Voltage	3000V	4000V
Overtoltage Category	OV3	OV2
Pollution Degree	PD3	PD2
Creepage Distance required	> 25mm	> 22mm
Creepage Distance on product	> 26mm	
Leakage Distance required	> 45mm	> 24mm
Leakage Distance on product	> 48mm	

- RMS Withstand Voltage @ 50 Hz required:

Table 2 – Withstand Voltage		
Rated Voltage	3000V	4000V
Overtoltage Category	OV3	OV2
Pollution Degree	PD3	PD2
Rated Impulse Voltage (U _{ni}) per EN50124-1/A2, tab. A2	20kV	18kV
Withstand Voltage per EN50124-1/A2, tab. B1	9.4kV	9kV
Withstand Voltage per EN50467, tab. 14	11kV	9.9kV

- RMS Withstand Voltage @ 50 Hz used for herein tests sequence: 12kV

Product Specification



- Insulation Resistance: > 5000MΩ
- Contact resistance: < 0.15mΩ
- Rated Current: to be determinate for a rising of 50K and 60K (for investigation current is also measured for a rising of Max operating temperature – ambient temperature)
- Operating Temperature range: -55 / +100°C
- Degree of Protection per EN60529-1/A1: IP66 (required by EN50467) IP67, IP68 5m
- Salt Mist resistance: 500h (240h required by EN50467)
- Mating Cycles: 500
- Insertion Force per contact: < 80N
- Vibration & Shocks per EN61373: category 2 (bogie)
- Fire & Smoke Classification per EN45545-2+A1: R22:HL3 / R23:HL3
- Fluids Resistance: Oxalic Acid, Sodium Hydroxide, IRM 902 Oil

3.3. Performance and tests description

Product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Paragraph 3.4. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per EN50467 / EN60068-1.



3.4. Tests Requirements and Procedures summary

Table 3 – General, Group 0 (non normative)				
No.	Measurements to be performed		Condition	Requirements
	Test Items	EN60512		
01	Visual & dimensional examination	1a, 1b	Any existing cover shall be removed, if required	EN50467, 6.8, 6.9, 6.15 Dimensions shall comply with the drawings
02	Conformity of marking	1a	Any existing cover shall be removed, if required	EN50467, 6.2
03	Contact resistance	2b	Mated sample Test current: assigned current. (a) Measuring points: at the end of the termination. (b) All 3 contacts. Test Voltage DC: $1 < U (V) < 60$	Contact resistance shall be 0.15m Ω max
04	Insulation resistance	3a	Unmated sample Test voltage: 1000V DC $\pm 50V$ Measurement points (b): Contact/contact Contact/earth (c) Measurement after 60s $\pm 5s$	Insulation resistance shall be $> 5000M\Omega$
05	Dielectric Strength	4a	Mated sample Measurement points (b): Contact/contact Contact/earth (c) Test voltage: RMS withstand voltage 12kV, AC 50Hz	EN50467, 6.12 There shall be no breakdown or flashover
Note: (a) assigned current: current measured during the temperature rise test C1 @ 50K (b) measuring points: at the conductors as close as possible to the termination. If not possible, the conductor resistance shall be recalculated (c) earth in the sense of non-live metal parts (e.g plug or receptacle housings here)				



Table 4 – Mechanical Tests, Group A (per EN50467, tab. 5)

Test phase (a)	Test Designation	Test according to		Severity or conditions	Measurements to be performed		Requirements
		EN60512	EN50467		Designation	EN60512	
A1	Visual and dimensional examination			Any existing cover shall be removed, if required	Visual and dimensional examination	1a, 1b	EN50467, 6.2, 6.8, 6.9, 6.15 Dimensions shall comply with the drawings
A2 (b)	Durability of marking						
A3	Polarisation	13e		Tests force: 20N or 1.5 times the insertion force, whichever is higher			EN50467, 6.3, 6.8
					Visual examination	1a	No damage likely to impair function
A4 (c)	Interlock						
A5 (d)	Terminations						
A6	Contact retention in insert	15a		Test load shall be 3 times the specified insertion force (mating) of 1 contact or the specified insertion force of 1 contact + 50N, whichever is less. The minimum test load shall not be less than 20N.			EN50467, 6.15
					Visual examination	1a	No axial displacement likely to impair normal operation
A7.1 (e)	Cable strain relief resistance to cable pull						
A7.2 (e)	Cable strain relief resistance to cable torsion						

Product Specification



A8	Mechanical strength impact	7b		Only free connector (plug) Dropping height: 750mm for specimens of mass \leq 250g, otherwise 750mm Dropping cycles: 8 Position in 45° steps, 1 cycle per position			EN50467, 6.15
					Visual examination	1a	Parts used for protection against electric shock shall not be damaged. Reduction of clearance and creepage distances is not allowed
<p>Note:</p> <ul style="list-style-type: none"> (a) test phase numbers are those per EN50467 (b) product in test is laser marked, so not removable. Consequently test A2 is not applicable. (c) no interlock system, consequently test A3 is not applicable. (d) tests required per EN50467 refer to the EN60352-2 which is applicable for crimped connections up to 10mm², the herein products in tests allow contact terminations from 50 to 120mm². Consequently the tests to qualified the terminations has been done acc. to NFF00-363 (see test report 501-157003) (e) product in test is not equipped of strain relief, consequently tests A7.1 & A7.2 are not applicable 							


Table 5 – Service Life Tests, Group B (per EN50467, tab. 6)

Test phase (a)	Test Designation	Test according to		Severity or conditions	Measurements to be performed		Requirements
		EN60512	EN50467		Designation	EN60512	
B1	Initial measurement			Mated sample Test current: assigned current. (b) Measuring points: at the end of the termination. (c) All 3 contacts. Test Voltage DC: $1 < U (V) < 60$	Contact resistance	2b	Reference value for subsequent measurement
B2	Mechanical operation	9a	7.9	Operating cycles: 500 Rest period in the unmated position of approximately 30s Periodic lubrication of mating screws each 20 cycles			EN50467, 6.13
					Visual examination	1a	No damage shall occur which could impair normal use
B3	Final measurement			Same conditions as for test phase B1.	Contact resistance	2b	For initial contact resistance up to 10mΩ the maximum rise permitted shall be 50%. For initial contact resistance above 10mΩ the maximum rise permitted is 5mΩ. The higher value is permissible.
					Voltage proof	4a	EN50467, 6.12 There shall be no breakdown or flashover
Note: (a) test phase numbers are those per EN50467 (b) assigned current: current measured during the temperature rise test C1 @ 50K (c) Measuring points: at the conductors as close as possible to the termination. If not possible, the conductor resistance shall be recalculated							



Table 6 – Thermal Tests, Group C (per EN50467, tab. 7)

Test phase (a)	Test Designation	Test according to		Severity or conditions	Measurements to be performed		Requirements
		EN60512	EN50467		Designation	EN60512	
C1	Temperature rise	5a	7.8	Mated specimen, wired to cables of 500±50mm length (and so 1000±100mm between 2 contacts) All contacts connected together 1. Search current @ 50K 2. Search current @ 60K 3. Search current to reach the upper limiting temperature, +100°C (include ambient temperature) AC frequency: 50Hz			EN50467, 6.18; 6.19 The upper limiting temperature specified shall not be exceeded
Note: (a) test phase numbers are those per EN50467							



Table 7 – Climatic test, Group D (per EN50467, tab. 8)

Test phase (a)	Test Designation	Test according to		Severity or conditions	Measurements to be performed		Requirements
		EN60512	EN50467		Designation	EN60512	
D1	Initial measurement			Mated sample Test current: assigned current. (b) Measuring points: at the end of the termination. (c) All 3 contacts.	Contact resistance	2b	Reference value for subsequent measurement
D2	Cold	11j	6.18	Mated sample Test temperature: -55°C Test duration: 2hours	Visual examination	1a	EN50467, 6.7 No damage shall occur which could impair normal use
D3	Dry heat	11i	6.18	Mated sample Test temperature: +100°C Test duration: 7days	Visual examination	1a	EN50467, 6.7 No damage shall occur which could impair normal use
D4	Salt mist test	11f	7.14	Mated sample Test duration: 500hours (d) Checking stages: 120-240-360hours	Visual examination	1a	No damage shall occur which could impair normal use
D5	Final measurement			Same conditions as for test phase D1.	Contact resistance	2b	For initial contact resistance up to 10mΩ the maximum rise permitted shall be 50%. For initial contact resistance above 10mΩ the maximum rise permitted is 5mΩ. The higher value is permissible.
D6	Dielectric strength		7.12	Mated sample Measurement points (c): Contact/contact Contact/earth (e) Test voltage: RMS withstand voltage 12kV, AC 50Hz	Voltage proof	4a	EN50467, 6.12 There shall be no breakdown or flashover

Note: (a) test phase numbers are those per EN50467
(b) assigned current: current measured during the temperature rise test C1 @ 50K
(c) measuring points: at the conductors as close as possible to the termination. If not possible, the conductor resistance shall be recalculated
(d) 240h required by EN50467
(e) earth in the sense of non-live metal parts (e.g plug or receptacle housings here)



Table 8 – Degree of Protection Tests, Group E (per EN50467, tab. 9)

Test phase (a)	Test Designation	Test according to		Severity or conditions	Measurements to be performed		Requirements
		EN60512	EN50467		Designation	EN60512	
E1 (b)	Protection against electric shock						
E2 (c)	Provision for earthing						
E3 (d)	Degree of protection IP code (d)		7.7	IP6x IPx6 IPx7 IPx8, 5m (e)			EN50467, 6.11
E4 (f)	Dielectric strength		7.12	Test voltage: RMS withstand voltage 12kV, AC 50Hz Test voltage applied between all contacts connected together and the accessible surface	Voltage proof	4a	EN50467, 6.12 There shall be no breakdown or flashover

- Note:
- (a) test phase numbers are those per EN50467
 - (b) connectors non IP2X, specified as not to be used under load when disconnected, consequently test E1 is not applicable
 - (c) connectors without earthing contact, consequently test E2 is not applicable
 - (d) bulkhead receptacle cables are removed for IPxx test
 - (e) IPx8, 5m is done by applying a 0.5 bar depression inside connectors
 - (f) after each IPxx, the voltage proof test is done before unmate of connectors

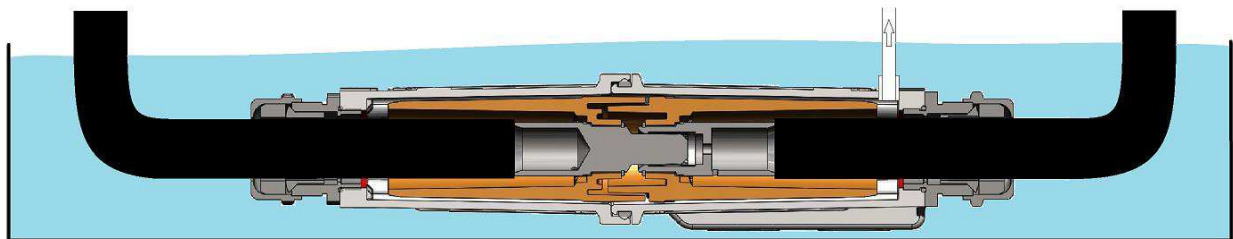


Figure 2a – IPx8 test schema for straight connectors

⇒ Arrow represent air pressure of -0.5 bar

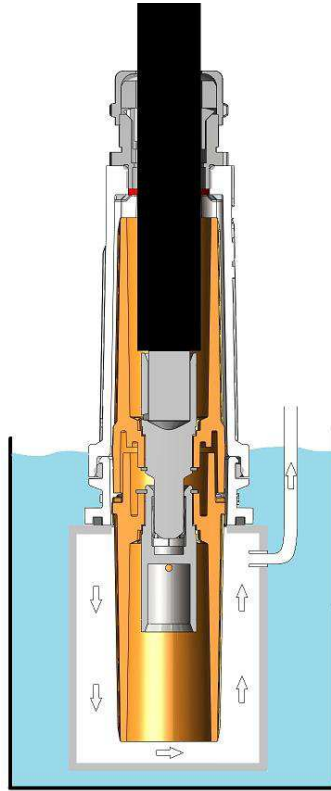


Figure 2b – IPx8 test schema for straight plug + bulkhead receptacle

⇒ Arrow represent air pressure of -0.5 bar



Table 9 – Vibration and Shock Tests, Group F (per EN50467, tab. 10)

Test phase (a)	Test Designation	Test according to		Severity or conditions	Measurements to be performed		Requirements
		EN60512	EN50467		Designation	EN60512	
F1	Simulated long life random vibration at increased levels		EN61373: 1999, Clause 9	Connectors mated, all contacts wired in series and monitored for micro interruption. According to classification of intended mounting location: category 2 (bogie mounted)			EN50467, 6.16
					Contact disturbance	2e	Micro interruption $\leq 1 \mu s$
					Visual examination	1a	No damage likely to impair function
F2	Shock		EN61373: 1999, Clause 10	Connectors mated. According to classification of intended mounting location: category 2 (bogie mounted)			EN50467, 6.16
					Visual examination	1a	No damage likely to impair function
F3	Random vibration test		EN61373: 1999, Clause 8	Connectors mated, all contacts wired in series and monitored for micro interruption. According to classification of intended mounting location: category 2 (bogie mounted)			EN50467, 6.16
					Contact disturbance	2e	Micro interruption $\leq 1 \mu s$
					Visual examination	1a	No damage likely to impair function
F4	Dielectric strength		7.12	Mated sample Measurement points (b): Contact/contact Contact/earth (c) Test voltage: RMS withstand voltage 12kV, AC 50Hz	Voltage proof	4a	EN50467, 6.12 There shall be no breakdown or flashover

Note: (a) test phase numbers are those per EN50467
 (b) measuring points: at the conductors as close as possible to the termination. If not possible, the conductor resistance shall be recalculated
 (c) earth in the sense of non-live metal parts (e.g plug or receptacle housings here)

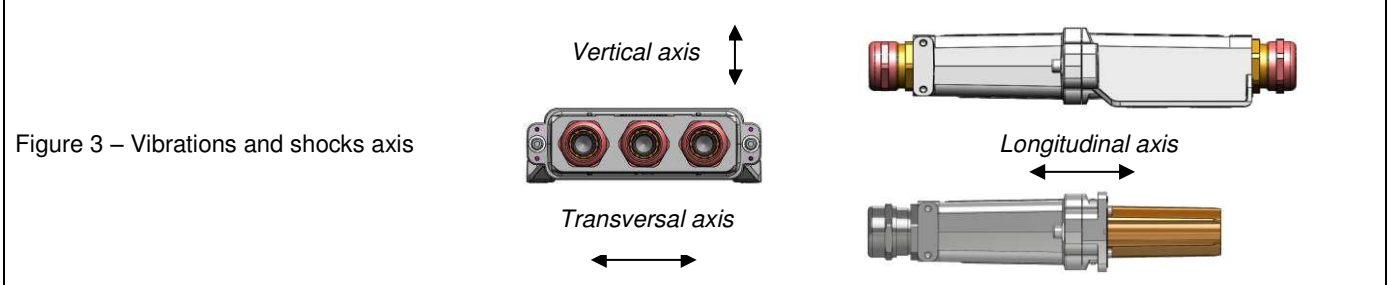




Table 10 – Resistance to Fluids, Group G (per EN50467, tab. 11)

Test phase (a)	Test Designation	Test according to		Severity or conditions	Measurements to be performed		Requirements
		EN60512	EN50467		Designation	EN60512	
G1	Fluid resistance	19c		Connectors unmated Fluids temperature (step1): Oxalic Acid (b) and Sodium Hydroxide (b): 23±2°C IRM 902 Oil: 50±2°C Ageing cycle temperature (step3): +65°C			EN50467, 6.23
G2					Engaging and separating forces	13a	No damage likely to impair function
G3					Contact resistance	2b	For initial contact resistance up to 10mΩ the maximum rise permitted shall be 50%. For initial contact resistance above 10mΩ the maximum rise permitted is 5mΩ. The higher value is permissible.
G4				Test voltage: 1000V DC ±50V Measurement points (b): Contact/contact Contact/earth (c)	Insulation resistance	3a	Insulation resistance shall be >500MΩ

Product Specification



G5	Dielectric strength		7.12	Mated sample Measurement points (c): Contact/contact Contact/earth (d) Test voltage: RMS withstand voltage 12kV, AC 50Hz	Voltage proof	4a	EN50467, 6.12 There shall be no breakdown or flashover
G6				Unmated sample Testing force: 200N Increase of force: ≤10N/s Test done successively on both side of the contacts	Contact retention in insert	15a	Axial displacement after the test ≤0.5mm
G7				Unmated sample Testing force: 240N (sum of all the contacts insertion force) Increase of force: ≤50N/s Test done successively on both side of the inserts	Insert retention in housing (axial)	15b	No displacement or damage likely to impair function
G8				Mated and unmated sample	Visual examination	1a	No damage likely to impair function
<p>Note:</p> <ul style="list-style-type: none"> (a) test phase numbers are those per EN50467 (b) normal solution of sodium hydroxide (c) measuring points: at the conductors as close as possible to the termination. If not possible, the conductor resistance shall be recalculated (d) earth in the sense of non-live metal parts (e.g plug or receptacle housings here) 							



Table 11 – Shielding Effectiveness, Group H (per EN50467, tab. 12)

Test phase (a)	Test Designation	Test according to		Severity or conditions	Measurements to be performed		Requirements
		EN60512	EN50467		Designation	EN60512	
H1 (b)	Shielding Effectiveness or						
	Effective transfer of impedance						

Note: (a) test phase numbers are those per EN50467
 (b) connectors are passive components that are themselves intrinsically immune from EMC disturbances (...) Connectors are part of system or sub-system. EMC requirements for railway rolling stock described in EN 50121 series can be verified only for complete systems. Under several circumstances the most concerning issue in a wiring installation is the cable shielding characteristic, not the connector shielding characteristic. (EN50467, section 6.21). Consequently test H1 is not applicable



Table 12 – Tests on raw materials (per EN50467, tab. 13)

Test Designation (a)	EN50467 Article	Applicable standard	Severity or conditions	Requirements
Fire behavior of materials and components (b)	6.22	EN45545-2+A1:2016	Classification HL2 minimum	R22 & R23
Resistance to ozone (c)	6.24	ISO1431-1:2004	Method B Test duration: 24h, 500ppb Temperature: 40°C Elongation: 20%	Visual examination No cracks shall appear
Resistance to UV (d)				
Note:	(a) These tests are done on standardized tests samples. Quantity and dimensions of samples are determinate on the applicable standard. Each of these is realized in an external laboratory approved ISO17025 and sanctioned by a certification report. (b) for non-metallic materials which have a weight above 10g (c) for exposed rubber and plastic parts (d) no none metallic part exposed to sunlight, consequently UV test is not applicable			



3.5. Sampling

Number of Specimen as below table:

Table 12a - Number of Specimen (per EN50467, tab. 4) – FXP1 straight connectors version		
Test	Description	Numbers & consist of
Group 0	General	All specimens
Group A	Mechanical	1 pair connectors
Group B	Service Life	3 pairs connectors
Group C	Thermal	1 pair connectors
Group D	Climatic	1 pair connectors
Group E	Degree of Protection	2 pairs connectors
Group F	Vibration and Shock	1 pair connectors
Group G	Resistance to Fluids	4 pairs connectors (a)
Group H	Shielding effectiveness	Not applicable
-	Tests on raw materials	According to the applicable standards
Note: (a) 1 specimen per fluid		

Table 12b - Number of Specimen (per EN50467, tab. 4) – FXP1 straight plug + bulkhead receptacle		
Test	Description	Numbers & consist of
Group 0	General	All specimens
Group A	Mechanical	Not applicable
Group B	Service Life	Not applicable
Group C	Thermal	Not applicable
Group D	Climatic	Not applicable
Group E	Degree of Protection	2 pairs connectors
Group F	Vibration and Shock	1 pair connectors
Group G	Resistance to Fluids	1 pair connectors
Group H	Shielding effectiveness	Not applicable
-	Tests on raw materials	According to the applicable standards
Note: (a) only insert retention in housing test has to be done, other tests are similar compared to the straight version		



3.5.1. Samples BOM

A pair of connectors is composed of a plug and a receptacle, equipped of contacts and cable glands per hereafter table:

Table 13 – Samples BOM		
Sub-assembly or components	Straight version Connectors	Straight plug + bulkhead receptacle
Straight Receptacle	FXP1RS-3M32-S	-
Straight Plug	FXP1PS-3M32-P	FXP1PS-3M32-P
Semi-recessed Receptacle	-	FXP1WC-3XXX-S
Female contact to be crimped 120mm ²	FXP-CS12-M120S-CU 3 per receptacle	FXP-CS12-M120S-CU 3 per receptacle
Male contact to be crimped 120mm ²	FXP-CS12-M120P-CU 3 per plug	FXP-CS12-M120P-CU 3 per plug
Cable gland	0401-0415AS 3 per connector	0401-0415AS 3 per connector

Cables used for the herein tests sequence is:

- Huber+Suhner, Radox series, EN50264-3-1 3600V 1x120 MM (vendor PN 12586169)

3.5.2. Samples setting-up

Product shall be prepared and wired according to the relevant application specification (114-series), per section 2.1

Crimping tools to be used:

Table 14 – Crimping Tools					
Cable section (mm ²)	Hydraulic crimping tools				TE lab ref
	Pump	Cylinders	Flexible	Dies	
120	PA133K	SU210K	F4622K	TN 120V20	



3.6. Tests Sequence for FXP1 straight version

Table 15a - Tests Sequence – FXP1 straight connectors version									
Test or Examination	Test Group								
	0	A	B	C	D	E	F	G	H
	Test Sequences								
Visual and dimensional examination	1	1							
Conformity of marking	2								
Visual examination		2	3		3,5, 7		2,4, 6	8	
Polarisation		3							
Contact retention in insert		4						6	
Mechanical strength impact		5							
Contact resistance	3		1,4		1,8			3	
Mechanical operation			2						
Dielectric strength - Voltage withstanding	5		5		9	2	7	5	
Temperature rise				1					
Cold					2				
Dry heat					4				
Salt mist test					6				
Degree of protection – IP code						1			
Simulated long life random vibration at increased levels							1		
Shock							3		
Random vibration test							5		
Fluid resistance								1	
Engaging & separating forces								2	
Insulation resistance	4							4	
Insert retention in housing (axial)								7	

Notes:

- Numbers indicate the sequence in which the tests are performed.



3.7. Tests Sequence for FXP1 semi-recessed version

Table 15b - Tests Sequence – FXP1 straight plug + bulkhead receptacle version									
Test or Examination	Test Group								
	0	A	B	C	D	E	F	G	H
	Test Sequences								
Visual and dimensional examination	1								
Conformity of marking	2								
Visual examination							2,4, 6	8	
Contact resistance	3								
Dielectric strength - Voltage withstanding	5					4	7		
Protection against electric shock						1			
Provision for earthing						2			
Degree of protection – IP code						3			
Simulated long life random vibration at increased levels							1		
Shock							3		
Random vibration test							5		
Insulation resistance	4								
Insert retention in housing (axial)								7	

Notes:

- Numbers indicate the sequence in which the tests are performed.



4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

4.1.1. Specimens Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production.

4.1.2. Test Sequence

The samples shall be prepared in accordance with product drawings. They shall be selected at random from current production.

4.1.3. Test Report

A test report shall be released based on herein test specification added to below information:

- Samples working order
- Tests devices list + calibration dates
- General conclusion
- For each test:
 - Sampling number
 - Samples setting-up
 - Test devices
 - Methodology description
 - Test date(s)
 - Results summary
 - Test conclusion
- Appendix: Customer Drawings, Insulation coordination drawing, Tests results detailed

4.2. Requalification Testing

If changes significantly affecting form, fit or functions are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of paragraph 3.4. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before re-submittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification. Bulk wire resistance shall be subtracted from resistance readings.



APPENDIX

Drawing C-211443 : FXP1 straight receptacle, 3xM32 outlets, female insulator

REFERENCES	TABLEAU DES CARACTERISTIQUES / CHARACTERISTICS TABLE	N° FFP
Instructions de montage	Mounting instructions	114-157005-1
Nom de référence	Standard reference	EN94672012
Matériau boîtier	Material shell	Aluminium
Finition boîtier	Shell plating / finish	Black PU paint RoHS
Matériau isolant	Insulator material	Polyamide
Fiche techniques contacts	Contact technical specifications	114-157005
Raccordement des contacts	Contact termination	See contacts
Calibre du contact	Contact gauge	See contacts
Plage de câble admissible	Cable crimping range	See cable gauge
Épaisseur du câble dans l'isolant	Cable thickness in insulator	825 nm
Capacité du presse-étoupe	Cable gland capacity	See cable gland
Tension nominale d'utilisation	Max. service voltage	See table
Intensité nominale admissible	Max. current rating	See contacts
Tension de tenue	Withstand voltage	7 900 V
Ligne de fuite nominale	Minimum creepage distance	481 mm
Distance dans l'air nominale	Minimum insulation distance in air	88.3 mm
Catégorie de sur-tension	Over-voltage category	See table
Degré de pollution	Pollution degree	See table
Résistance d'isolement	Insulation withstand	7 5000 MΩm
Résistance de contact	Contact resistance	7 0.15 mΩm
Contraintes de soudage	Soldering constraints	See table
Impédance	Impedance	N/A
Température de service	Operating temperature	-40 °C / +100 °C
Unité de protection (connecteur accouplé)	Protection unit (mated connector)	IP68 5m
Tenue à la corrosion (connecteur accouplé)	Corrosion resistance (mated connector)	200h salt spray
Tenue aux fluides	Fluid resistance	conformant avec l'ISO 16750-1
Classement feu-fumée	Fire smoke class	FTMP 653
Endurance	Life / mating cycles	500 cycles
Poids	Weight	1029 g
Système de verrouillage	Locking system	3-60 CHC screws (on plug)
Système de codage	Keying system	5 codings
Tenue aux chocs	Shock behaviour	EN13732000 cat. I, class 3
Tenue en vibration	Vibration behaviour	EN13732000 cat. I, class 3
Couleur de verrouillage	Locking colour	741 In
Effort d'accouplement	Mating force	7 240 N
Rétention du contact (sans l'isolant)	Contact retention (no insulator)	7 80 N
Rétention du câble (sans "Bosches")	Cable retention (no "Bosches")	N/A
Effort de traction du câble sur la fiche	Cable pulling force on plug	N/A
Rétention de l'isolant (sans le boîtier)	Insulator retention (no shell)	7 240 N
Protection des contacts de ligne	Line contact protection	Non

Project NR: PRJ-16-000907077

REV	DESCRIPTION	DATE	BY	APPV
F	Création - diffusion 332656	2016/05/04	MB	MV
G	Modification rep. 1, ref. 10-KA-212656A-JD7A devient 10-KA-211443A (subrogement de référence) - 2017-10/05	2017/10/05	JFG	MV

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

2 Instructions de mise en oeuvre à appliquer par le client
 Customer instructions to be applied by the customer

3 Customer manual = 157002-2

Marquage laser : Année semaine + TE + FXP1RS-3M32-S
 Laser marking : Year-Week + TE + FXP1RS-3M32-S

Marquage laser : Lignes de conducteurs (III, II, I)
 Laser marking : Conductor lines (III, II, I)

Isolant compatible avec les contacts : Contact femelle calibre 12mm à sertir de 50 à 120mm2 (plan S1884-211447)
 Insulator available for contacts : Female contacts caliber 12mm to be crimped from 50 to 120mm2 (drawing S1884-211447)

Lignes de conducteur repérées de moulage
 Conductor lines marking molded on insulator (III, II, I)

Pion détronpage à monter par le client
 Keying pin to be mounted by the customer

Service voltage (V)	1500V	3000V	4000V
Over-voltage category	DV3	DV2	DV2
Pollution degree	PD3	PD2	PD2

10 Specification de packaging : 107-157005
 Packaging spec : 107-157005

Logements de chaque côté pour pion de détronpage (rep.5)
 Slots on each side for keying pin (rep.5)

Ø5,5 de chaque côté pour cosse de terre optionnelle
 Ø5,5 on each side for optional earth lug

QTY	DESCRIPTION	REMARKS	REP
1	Sachet déshydratant / Deshydrating bag		9
1	Sachet ZIP / ZIP bag		8
1	Boîte / Box		7
2	Helicoil+ M6x1 / Helicoil+ M6x1		6
4	Pion / Keying pin		5
1	Joint périphérique taille 1 / Peripheral seal size 1		4
1	Vis CHC M3x10 / CHC screw M3x10		3
1	Isolant femelle taille 1 pour 3 col. 12 / Female insulator size 1 for 3 col. 12		2
1	Corps d'embase fixe taille 1 à 3 ou 4 sorties / Surface mounting shell size 1 with 3 or 4 outlets		1

Peinture PU noir RoHS / Black PU paint RoHS
 Fiche matière / Data sheet
 Matière / Material
 Masse (g) / Net Weight (g)
 Quantité / Qty
 Codification / Designation
 Désignation / Designation

Isometric view Scale 1:2

Référence commerciale / Commercial reference : FXP1RS-3M32-S

YE-KA-211443A-0000 PART NO

THIS DRAWING IS A CONTROLLED DOCUMENT. DATE: 29/NOV/2016 BY: JF GALIPAUD / M.V. MARD DATE: 29/NOV/2016 BY: M.V. MARD

Embase femelle taille 1 / 3 col. 12 à sertir 50-120mm² / M32
 Size 1 female receptacle / 3 col. 12 to be crimped 50-120mm² / M32

106712 g A1 C-211443

CUSTOMER DRAWING



Drawing C-211444: FXP1 straight plug, 3xM32 outlets, male insulator

COUPE A-A

M32x1,5-6H (x3)

155±0,5

Tableau des caractéristiques / Characteristics table

REPERES	DESCRIPTION	UNIT	REFERENCE
N° FIP	Mounting instructions	N/A	114-157005-3
Normes de références	Standard reference	N/A	EN50467:2012
Matériau boîtier	Material shell	Aluminium	
Matériau isolant	Insulation material	Black PU paint	
Matériau isolant	Insulation material	Polyamide	
Fiche techniques contacts	Contact technical data	Al (aluminum)	114-157005
Accordement des contacts	Contact termination	See contacts	
Calibre du contact	Contact gauge	See contacts	
Plage de câble admissible	Cable cross section range	See cable glands	
Ø maxi du câble dans l'isolant	Max cable dia in shell	Ø29 mm	
Capacité du presse-étoupe	Cable gland capacity	See cable glands	
Tension maxi d'utilisation	Max service voltage	See table	
Intensité maxi admissible	Max current rating	See contacts	
Tension de tenue	7 500 V		
Angle de fuite nominale	Minimum creepage distance	451 mm	
Distance dans l'air minimale	Minimum insulation distance in air	26,3 mm	
Catégorie de surtension	Over voltage category	See table	
Degré de pollution	Pollution degree	See table	
Résistance diélectrique	Insulation withstand	7 500V/100%	
Résistance de contact	Contact resistance	≤ 0,15 mΩ	
Continuité de sinage	Welding continuity	OK	
Impédance	Impedance	N/A	
Température de service	Oper temp. temperature	-40 °C / +100 °C	
Indice de protection (connecteur accouplé)	Protection index (mated connector)	IP68 5m	
Tenue à la corrosion (connecteur accouplé)	Corrosion withstanding capacity	200h salt spray	
Tenue aux fluides	Fluids withstanding	Compliant with relevant requirements	
Classement feu-fumée	Fire and smoke class	EN 50425-2 / IEC 60332-3	
Endurance	Wiring / crimping cycles	200 cycles	
Poids	Weight	200 g	
Système de verrouillage	Coupling system	2x M6 CHC screws	
Système de serrage	Wiring system	2 couplings	
Tenue aux chocs	Shock resistance	EN61373:2000 cat. 1, classe B	
Tenue aux vibrations	Vibration resistance	EN61373:2000 cat. 1, classe B	
Couple de serrage	Tightening torque	7±1 Nm	
Effort d'accouplement	Mating force	1 140 N	
Rétention du contact (dans l'isolant)	Contact retention (into shell)	0,10 N	
Rétention du calibre (masse - Broche)	Cable retention (into shell)	N/A	
Effort de traction du câble sur la fiche	Cable pulling force on plug	N/A	
Rétention de l'isolant (dans le boîtier)	Shell retention (into shell)	0,240 N	
Protection des contacts de ligne	Line contact protection	OK	

Project NR: PRJ-16-00090707

REVISIONS			
N°	DATE	DESCRIPTION	BY
D	29NOV2016	Création - diffusion 332266	MB MV
E	29NOV2017	Modification rep. 1, ref. 114-157005-3 et 114-157005-2016 (ajout de l'option 108-157004-001) - ref. 114-157005-2016 (ajout de l'option 108-157004-001) - ref. 114-157005-2016 (ajout de l'option 108-157004-001)	JFG MV

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

2 Instructions de mise en oeuvre à appliquer par le client
 Customer instructions to be applied by the customer

3 Customer manual = 157002-1

9

Service voltage according to EN50124-1/A2:2005			
Service voltage (V)	1500V	3000V	4000V
Over-voltage category	DV3	DV2	DV3
Pollution degree	PD3	PD2	PD2

10 Specification de packaging : 107-157005
 Packaging spec : 107-157005

11 Logements de chaque côté pour pion de débrayage (rep.7)
 Slots on each side for keying pin (rep.7)

12 M5 pour cosse de terre optionnelle (longueur utile 10mm)
 Cs = 2,4 Nm suivant NF F61-021 tableau 2
 M5 for optional earth lug (thread length 10mm)
 Cs = 2,4 Nm according to NF F61-021 table 2

13 Couple de serrage 7±1 Nm
 Tightening torque 7±1 Nm

14 M5 de chaque côté pour tôles de bridage optionnelles
 (Plan S1884-211442)
 M5 on each side for optional frames
 (drawing S1884-211442)

-	-	-	1,50	1	0206-0329AS	Sachet déshydratant Deshydrating bag	10	
-	-	Plastique	0,80	1	Y000000000-EMB030	Sachet ZIP ZIP bag	9	
-	-	Carton	88,63	1	Y00000-0206-0033AS	Boite Box	8	
△	-	FTMP 653	Polycarbonate	0,21	4	YD-KA-210840A-QM00	Pion Keying pin	7
-	-	Inox	Stainless steel	1,04	4	Y00000-CHCM03X10-I	Vis CHC M3x10 CHC screw M3x10	6
-	-	FTMP 803	Polyéthylène Polyethylene	0,05	2	205193-A00	Rondelle pour vis imperdable M06 Washer M06	5
-	-	Inox	Stainless steel	8,73	2	CHCM06x25-I	Vis CHC M6x25 Screw CHC M6x25	4
-	-	Inox	Stainless steel	0,14	2	MU-06-I	Rondelle plate Flat washer	3
-	-	FTMP 457	Polyamide Polyamide	201,71	1	YK-KA-210188A-PN00	Isolant mâle taille 1 pour 3 cal. 12 Male insulator size 1 for 3 cal. 12	2
-	-	Peinture PU noir RoHS Black PU paint RoHS	Aluminium	664,83	1	YF-KA-212638A-JD7A	Corps de fiche droite taille 1 à 3 ou 4 sorties Straight plug shell size 1 with 3 or 4 outlets	1
Observations	Protection	Fiche matière	Matière	Masse (g)	Nbr	Codification	Désignation	REP
Remarks	Plating	Data sheet	Material	Weight (g)	Qty	Part number	Designation	Item

Isometric view Scale 1:4

TE-211444-0000 PART NO

THIS DRAWING IS A CONTROLLED DOCUMENT

DATE	BY	DESCRIPTION
29NOV2016	R BONNIN	Création
29NOV2016	JP GALIPAUD	Validation
29NOV2016	M VIGNARD	Validation

TE Connectivity

Produit: Fiche mâle droite taille 1 / Shell 12 à servir 30-120mm / Shell 12
 Size 1 male straight plug / Shell 12 to be crimped 30-120mm / Shell 12

Matériau: Aluminium
 Matière: Aluminium

Poids: 97951 g
 Masse (g): 97951 g

Version: A1
 Révision: A1

Customer Drawing

Scale: 1:4

Product Specification



Drawing C-211440 - FXP1 Bulkhead receptacle, for contacts to be crimped, female insulator

COUPE A-A

Tableau des caractéristiques / Characteristics table	
REFERENCES	N° FTP: 114-157005-E
Instructions de montage	Mounting instructions
Normes de références	Standard references: NF F 61-030 et EN50467-031E
Matériau boîtier	Material shell: Aluminium
Matériau isolant	Material insulator: Polyamide
Fiche technique contacts	Contact technical sheet: 114-157005
Raccordement des contacts	Contact termination: To be crimp and to be screw
Calibre du contact	Contact gauge: 018 mm
Plage de câble admissible	Cable cross section range: N/A
Maxi du câble dans l'olive	Maxi of cable per cell: 029 mm
Capacité du presse-étoupe	Cable gland capacity: N/A
Tension maxi d'utilisation	Max service voltage: Voir tableau
Intensité maxi admissible	Max current rating: Voir contact
Tension de tenue	Voltage withstanding: 3000V
Ligne de fuite minimale	Minimum creepage distance: 47 mm
Distance dans l'air minimale	Minimum insulation distance in air: 25 mm
Catégorie de surtension	Over voltage category: Voir tableau
Degré de pollution	Pollution degree: Voir tableau
Résistance d'isolement	Insulation withstanding: 2 500 MΩm
Résistance de contact	Contact resistance: 0,15 mΩm
Continuité de blindage	Shielding continuity: Oui
Dissipation	Dissipation: N/A
Température de service	Operating temperature: -40°C to +100°C
Indice de protection (connecteur accouplé)	Protection index (mated connector): IP 68 connecté
Tenue à la corrosion (connecteur accouplé)	Corrosion withstanding (mated connector): 500 heures SS
Tenue aux fluides	Fluid withstanding: Selon IFF61030
Classement feu-fumée	Fire and smoke class: EN 50423-2 / EN 50423-3 / EN 50423-4
Endurance	No. of mating cycles: 200 cycles
Poids	Weight: 200 grammes
Système de verrouillage	Locking system: Ex via ChC M6
Système de codage	Keying system: 2 codage
Tenue aux chocs	Shock behaviour: EN61373-200 cat.1, class B
Tenue en vibration	Vibration behaviour: EN61373-200 cat.1, class B
Couple de verrouillage	Clamping torque: 2,1 Nm
Effort d'accouplement	Mating force: 140 N
Rétention du contact (sans l'isolant)	Contact retention (into shell): 80 N
Rétention du câble (sans le boîtier)	Cable retention (into plug): 21g - 011,957
Effort de traction du câble sur la fiche	Cable pulling force on plug: N/A
Rétention de l'isolant (sans le boîtier)	Shell retention (into shell): 240 N
Protection des contacts de ligne	Line contact protection: Non

REVISIONS				
1	Création - diffusion 33266	2016/08/04	MB	MV
2	Modification rep. 1, ref YG-KA-212677A-JTA devient YG-KA-212677A-JTA (aménagement de câbles) - BPP 332643	2016/08/04	JFG	MV

Project NR: PRJ-16-000907077

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

2 Instructions de mise en oeuvre à appliquer par le client
 Customer instructions to be applied by the customer

3 Customer manual = 157002

⚠ Marquage laser : Année-Semaine + TE + FXP1WC-3XXX-S
 Laser marking : Year-Week + TE + FXP1WC-3XXX-S

⚠ Isolant compatible avec les contacts : Contact femelle calibre 12mm à sertir de 50 à 120mm2 (plan S1884-211447)
 Insulator available for contacts : Female contacts caliber 12mm to be crimped from 50 to 120mm2 (drawing S1884-211447)

⚠ Lignes de conducteur repérées de moulage
 Conductor lines marking molded on insulator (III, II, I)

⚠ Pion détroppage à monter par le client
 Keying pin to be mounted by the customer

Service voltage according to EN50124-1/A2:2005				
Service voltage (V)	1500V	3000V	4000V	
Over-voltage category	OV3	OV2	OV3	OV2
Pollution degree	PD3		PD2	

9 Specification de packaging : 107-157005
 Packaging spec : 107-157005

⚠ Logements de chaque côté pour pion de détroppage (rep.6)
 Slots on each side for keying pin (rep.6)

⚠ Ø5,5 pour vis fixation panneau
 Ø5,5 holes for panel screws

⚠ M4 pour cosse de terre optionnelle (longueur utile 8mm)
 Cs = 2,4 Nm suivant NF F61-021 tableau 2
 M4 for optional earth lug (thread length 8 mm)
 Cs => 2,4 Nm according to NF F61-021 table 2

Isometric view Scale 1:2

179±0,25
194,5±0,8
48±0,15
62±0,80
4X

80,2±0,8
24,8±0,5

Découpe panneau / Panel cutting-out (angles vifs à éliminer / smooth angles mandatory)

149±0,2
179±0,2
43±0,2
48±0,1
4X) x M5
4X) R6

Vue B
B View

QTY	DESCRIPTION	UNIT	QTY	DESCRIPTION	UNIT	QTY	DESCRIPTION	UNIT
1	Sachet déshydratant	10	1	Sachet ZIP	9	1	Boîte	8
1	Plastique	0.80	1	Carton	88.63	1	Helicoil+ M6x1	7
1	Carton	88.63	1	Helicoil+ M6x1	7	1	Joint plat embase semi encastrée taille 1	6
2	INDX Stainless	0.62	2	Flat seal for semi recessed receptacle size 1	6	4	Pion	5
1	FTMP 874 Elastomère	3.99	1	YB-KA-210572A-RE00	1	1	Joint périphérique taille 1	4
4	FTMP 653 Polycarbonate	0.21	4	YD-KA-210840A-QM00	4	1	Vis ChC M3x10	3
1	FTMP 874 Elastomère	4.53	1	YB-KA-210206A-RE00	1	4	ChC screw M3x10	3
4	Inox Stainless steel	1.04	4	Y00000-CHCM03X10-I	4	1	Isolant femelle taille 1 pour 3 cal. 12	2
1	FTMP 457 Polyamide	207.36	1	YK-KA-210184A-PN00	1	1	Female insulator size 1 for 3 cal. 12	2
1	Peinture PU noir RoHS	189.86	1	YG-KA-212677A-JD7A	1	1	Corps de traversée de paroi Taille 1	1
1	Black PU paint RoHS	189.86	1	YG-KA-212677A-JD7A	1	1	Bulkhead shell Size 1	1

Observations / Remarks

Protection	Fiche matière	Matériau	Masse (g)	Nbr	Codification	Désignation	REP
Plating	Data sheet	Material	Weight (g)	Qty	Part number	Designation	Item

Référence commerciale / Commercial reference : FXP1WC-3XXX-S

THIS DRAWING IS A CONTROLLED DOCUMENT:		TE Connectivity	
APPROVED	30/NOV/2016	DATE	30/NOV/2016
DESIGNED	30/NOV/2016	APP. NO.	30/NOV/2016
DRAWN	30/NOV/2016	SCALE	1:1
CHECKED	30/NOV/2016	SHEET	1 / 1
APPROVED	30/NOV/2016	REV	01

Ensemble semi-encastrée femelle taille 1 / 3 cal. 12 à sertir
 Size 1 female semi-recessed receptacle / cal. 12 to be crimped

WEIGHT: 502.41 g
 CUSTOMER DRAWING



Drawing C-211447: FXP series Female contacts caliber 12 to be crimped

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Project NR PRJ-16-000907077

REVISIONS		DATE	BY	APPV
A	Création - Diff 332079	20FEB2017	MB	MV
B	Ajout Item4 sur les réf BE DM17-036 ; Diffusion 332362	22JUN2017	EL	MV

Ref. Commerciale	Reference	Ref. Commerciale	Reference BE
FXP-0312-M005-CU			
FXP-0312-M005-4L			
FXP-0312-M005-2L			
FXP-0312-M005-CU			
FXP-KA-2-4471-010			
FXP-KA-2-4472-010			
FXP-KA-2-4473-010			
FXP-0312-M005			
FXP-0312-M005			
FXP-0312-M005			
FXP-KA-2-4471-010			
FXP-KA-2-4472-010			
FXP-KA-2-4473-010			

Nbr. Qty	Description	Quantité	Poids	Matériau	Protection
1	YD KA 100010/A AATA	1	64,00	Laiton	Argenture
1	YD KA 100070/A AATA	1	79,00	Laiton	Argenture
1	YD KA 100020/L AATA	1	50,00	Laiton	Argenture
1	YD KA 100010/A AATA	1	60,00	Laiton	Argenture
1	YD KA 100070/A AATA	1	75,00	Laiton	Argenture
1	YD KA 100020/L AATA	1	50,00	Laiton	Argenture
1	YD KA 100020/B AATA	1	68,00	Laiton	Argenture
1	YD KA 100020/L AATA	1	50,00	Laiton	Argenture
1	YD KA 100020/D AATA	1	58,00	Laiton	Argenture
2	7100-18-1	1	1,00	Inox	Argenture
1	10000-030440	1	1,00	Cuivre	Argenture
1	1000002000-FMR040	1	0,80	Plastique	Argenture

COUPE A-A

4 Longueur de dénudage de la gaine du câble = L2+1mm
Cable sheath stripping length = L2+1mm

5 Zone de sertissage
Mandatory crimping area

Commercial reference	Cross section (mm²)	Dimensions (mm)					Weight (g)
		L1	L2	L3	Ø1	Ø2	
FXP-0312-M005	100	58,4	21	16	Ø1	Ø2	78,3
FXP-0312-M005-CU	95	50,4	23	14	Ø1	Ø2	55,3
FXP-0312-M005-2L	70	49,4	22	13	Ø1	Ø2	50,3
FXP-0312-M005-4L	50	49,4	20	13	Ø1	Ø2	50,3

6

7 Specification de packaging : 107-157005
Packaging spec : 107-157005

see table

Référence commerciale / Commercial reference : see table

THIS DRAWING IS A CONTROLLED DOCUMENT.

APPROVED	DATE	TE Connectivity
DR	20FEB2017	
CHK	20FEB2017	
APP	20FEB2017	
NAME	S/E contact fenelle cal. 12 à sertir 50 à 120mm2	
PRODUCT SPEC	S/A female contact cal. 12 to be crimped 50 to 120mm2	
108-157004	SIZE	CODE CODE DRAWING NO
APPLICATION SPEC	A2	©-211447
114-157005	RESTRICTED TO	
WEIGHT see table	SCALE	2:1
CUSTOMER DRAWING	SHEET	1 of 1
	REV	B

1471-9 (3/13)
Sollidworks DRAWING

Ref : 687 BE rev B



Drawing C -211446 – FXP series Male contacts caliber 12 to be crimped

