
SOLARLOK PV4 Panel Mounted Connector

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1. SCOPE

1.1. Content

This specification covers the performance, tests and quality standards for a connecting system which allows the electrical connection of photovoltaic (PV) panels.

The connectors do not disconnect under load.

It is important to take care of the polarity before connecting. The connectors are to be used only to interconnect firmly fixed cables!

The connector allows for 4.0mm² / AWG12, 6.0mm² / AWG10 cable (see Fig.1 and Fig.2)



See Fig 1
Pin Connector Male
PV4-P.....
(PN 1971919)

See Fig 2
Socket Connector Female
PV4-P.....
(PN 1971920)

1.2. Qualification

When tests are performed, the following specified 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

- A. 109-1: General Requirements for Test Specifications
- B. Customer drawing and name

- PN 1971919 Pin Panel Mounted (PM) Connector (Male)
- PN 1971920 Socket Panel Mounted (PM) Connector (Female)

C. 114-106122: Application Specifications

2.2. Other Documents

- EN 50521: Connectors for photovoltaic systems - Safety requirements and tests
- EN 60068: Environmental testing
- EN 60512-1: Connectors for electronic equipment -Test and measurements
- EN 60529: Degrees of Protection Provided by Enclosures (IP Code)
- EN 60664-1: Insulation coordination for equipment within low-voltage systems (Part 1)
- Safety class II

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. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

- Rated Voltage TUV:1000V DC / UL:600V DC
- Rated Current 35A Max. for 4.0mm² / AWG12
(at 85°C ambient) 40A Max. for 6.0mm² / AWG10
- Ambient temperature -40°C ~+85°C
- Protection Degree IP68 (1m,24h)
- Protection Class II
- Cable Wire size 4.0mm² / AWG12; 6.0mm² / AWG10;
- Cable Jacket Diameter 4.5mm to 8.0mm
- Overvoltage category III
- Pollution degree 2

3.4. Performance and Test Description

Product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Paragraph 3.5. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per EN 50521

3.5. Test Requirements and Procedures Summary

General inspections			
No.	Test Items	Requirements	Procedure according
3.5.1	Visual and dimensional examination	Meets requirements of product drawing	Visual and dimensional examination EN 60512-1-1, Test 1a
Mechanical inspections			
3.5.2	Terminations and connection methods	The Min. values of the pull out force shall be 310N for 4mm ² and 360N for 6mm ² (Table 1 of EN60352-2) 5.5 of EN 50521	Pull out force test of crimped connections EN 60352-2
3.5.3	Contact retention force in insert	No axial displacement likely to impair normal operation 5.15.2 of EN 50521	Shall withstand for a force of 250N for 1 min applied in any direction permitted by the construction, either directly or through any wire or cable EN 60512-15-1 Test 15a
3.5.4	Insertion force (Mating force)	The Max. values of insertion force shall be 75N	The specified force shall be applied in the direction of the insertion of the unmated pair with the rate of 50mm/min. 6.3.13 of EN 50521 EN 60512-13-2 Test 13b
3.5.5	Withdrawal force (Un-mating force)	The Max. values of withdrawal force shall be 75N	The specified force shall be applied in the direction of the separation of the mated pair with the rate of 50mm/min 6.3.13 of EN 50521 EN 60512-13-2 Test 13b
3.5.6	Effectiveness of connector coupling device (Separation force)	Connector with locking device or with snap-in device shall withstand a load of 150N~300N 5.17 of EN 50521	The specified force shall be applied in the direction of the separation of the mated pair with the rate of 10 N/sec. 6.3.14 of EN50521 EN 60512-15-6 Test 15f
3.5.7	Mechanical Operation (Durability)	1) 100 operation cycles without load 2) No damage likely to impair function 5.11.1 of EN 50521	Shall be engaged and disengaged by means of A) a device simulating normal operating conditions, the speed of insertion and withdrawal shall be approximately 0.01m/s with a rest in the unmated position of approximately 30s B) manual mating/un-mating 300 Max. cycle per hour 6.3.5 of EN 50521 EN 60512-9-1 Test 9a
3.5.8	Mechanical strength impact	Parts used for protection against electric shock shall not be damaged. A reduction of clearance and creepage distance is not allowed	Dropping height: - 750mm for specimens of mass ≤ 250g - 500mm for specimens of mass > 250g Dropping cycles: 8 positions in 45° step, one cycles per position EN 60512-7-2 Test 7b

3.5.9	Mechanical strength at lower temperature (Impact test)	No breakage and Insulation resistance shall be not less than 400 MΩ	a) 1J knock 4 times b) perform at 25°C. precondition: 5h at minus 40±2°C 6.3.10 of EN 50521	
Electrical inspections				
3.5.10	Contact Resistance	Initial	Max. 0.5mΩ	Test current:1A Measure points ^a at the end of the termination (see Figure 1) EN 60512-2-2 Test 2b
		Final	Deviation of the contact resistance shall be no more than 50% of the initial reference value or 0.75mΩ	
3.5.11	Temperature Rise Test	temperature rise(ΔT) of a connector shall not exceed 30°C 5.13 of EN 50521	- length of test cable = 500mm ± 50mm - test shall be carried out with rated current as specified at ambient temperature:85°C - the test shall be continued until a constant temperature is obtained EN 60512-5-1 Test 5a 6.3.4 of EN 50521	
3.5.12	Dielectric Voltage Withstand Test (Voltage Proof)	No flashover or breakdown of voltage 5.10 of EN 50521	The test voltage shall be applied between all live parts and accessible surface, withstand voltage (50/60Hz) with a r.m.s value of 2000V plus (4 times rated voltage) for 1 min. 6.3.8b) of EN 50521 EN 60512-4-1 Test 4a	
3.5.13	Wet Leakage Current Test	A shallow trough or tank of sufficient size to enable the module with frame to be placed in the solution in a flat, horizontal position, it shall contain a water/wetting agent solution meeting the following requirements: resistivity: 3500 Ω .cm or less surface tension: 0.03N.m ⁻¹ or less temperature: 22 ± 3°C applied a 500V dc or the maximum rated system voltage of the module Test Per 10.15 of IEC 61215	Insulation resistance shall be not less than 400 MΩ	
Environmental inspections				
3.5.14	Degree of protection	no live parts shall be accessible by test finger 5.4.1 of EN 50521	Test finger IP20 at 10N per IEC 60529 Per 6.3.3.1 of EN 50521	
3.5.15	Degree of protection IP code ^c	IP 68, No ingress of water or dust 5.9 of EN 50521	Test IP 68 (1m,24h) per IEC 60529 Per 6.3.3.2 of EN 50521	
^c the connector should be mounted onto the panel (inverter system) or equivalent with the flat seal, and panel (inverter system) or equivalent for test also meet IP code requirement.				

Number of Specimen as below table:

Table 1 - Number of Specimen		
Test	Description	Numbers
Group A	Mechanical test, Separate specimen	2 ^a
Group B	Service life test, Mated	3
Group C	Thermal Test, Mated	3
Group D	Degree of protection Test, Mated	3 ^b

a: Each test item is for themselves separate tests
 b: Test specimens need mounted on box (which should has water proof function IP67 at least) for Mechanical strength at lower temperature (3.5.9 of Group A) and Degree of protection Test (Group D)

3.6. Test Sequences

Test or Examination	Test Group													
	A	B	C	D										
	Test Sequence (a)													
Visual and dimensional examination	1,3	1,5	1,5	1,5										
terminations and connection methods	2													
contact retention force in insert	2													
insertion force (mating force)	2													
withdrawal force (un-mating force)	2													
effectiveness of connector coupling device (separation force)	2													
Mechanical Operation (Durability)		3												
Mechanical strength impact	2													
Mechanical strength at lower temperature (Impact test)	2													
Contact Resistance		2,4	2,4											
Temperature Rise Test			3											
Dielectric Voltage Withstand Test (Voltage Proof)				4										
Wet Leakage Current Test				5										
Degree of protection				2										
Degree of protection IP code				3										

Notes:

1) Numbers indicate the sequence in which the tests are performed.

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

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

B. Test Sequence

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

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 3.5. 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.

Annex

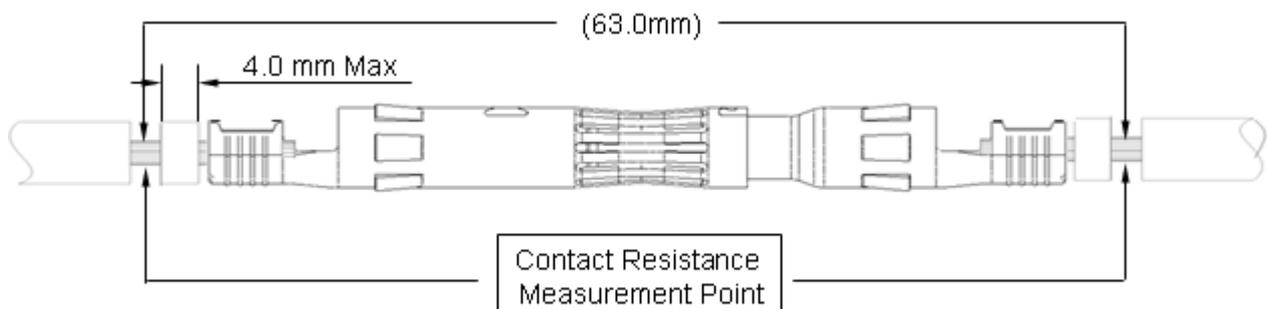


Figure 1

Contact Resistance Measure Point illustration