



1. Scope :

1.1 Contents

This specification covers the requirements for product performance, test methods and quality assurance provisions of Waterproof Micro USB I/O Socket.

Applicable product description and part numbers are as shown in Appendix 1.

2. Applicable Documents:

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

2.1 AMP Specifications :

A. 109-5000 : Test Specification, General Requirements for Test Methods

B. 501-61077 : Test Report

2.2 Commercial Standards and Specifications

A. ANSI/ EIA-364 Test Method for Electronic and Electric Parts

B. Universal Serial Bus 2.0 Specification

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 :

A. Contact (Plug & Receptacle)

Material : Copper alloy

B. Housing (Plug & Receptacle)

Material : Thermo Plastic

C. Shell, Lock lever, Hold plate (Plug & Receptacle)

Material : Stainless steel.

3.3 Ratings :

A. Voltage Rating : 30V AC/DC Max.

B. Current Rating ① Signal Only : 1 A/Pin Max.

② Power Apply : 1.8 A/Pin Max(Pin No. 1) / 0.5 A/Pin Max(Pin No. 2~5)

C. Operating Environment

Operating Temperature Rating : - 30°C to +85°C (Including temperature rising)

Operating Relative Humidity : 95% Max. (non-condensing)

※ High Limit temperature includes Raised Temperature by Operation.

D. Storage Environment

Storage temperature : - 30°C to +85°C (with Packing)

Storage Relative Humidity : 15% to 70% RH

3.4 Performance Requirements and Test Descriptions :

The product shall be designed to meet the electrical, mechanical and environmental performance requirements specified in Fig. 1. All tests shall be performed in the Room Temperature (15~35°C), Relative Humidity (25~85%), Air Pressure(86~106kPa), unless otherwise specified.

3.5 Test Requirements and Procedures Summary

Para.	Test Items	Requirements	Procedures
3.5.1	Examination of Product	No physical damage	Visual inspection No physical damage
Electrical Requirements			
3.5.2	Contact Resistance (Low Level)	Initial, 50mΩ Max. After test, $\Delta R = \pm 10\text{m}\Omega$ Max.	Mate connector with dry circuit(20mV Max., 100mA Max.). 4-wire measurement is required. Resistance of termination wires shall be deducted from the reading. (FIG.4)
3.5.3	Insulation Resistance	Initial, 1000MΩ Min. After test, 100MΩ Min.	Apply 500VDC with un-mating condition between adjacent contacts for 1 minute. [IEC 60512-3-1]
3.5.4	Dielectric withstanding Voltage	No voltage breakdown.	Apply 500VAC between all adjacent contacts in un-mating condition and 700VAC between Vbus pin & reinforcement(GND) in mating condition for 1 minute. [IEC 60512-4-1]
3.5.5	Temperature Rise	After test, 30°C Max.	Contact series, Mate connector and measure the temperature rise at the rated current after 2hours. [EIA-364-70A]
Mechanical Requirements			
3.5.6	Mating force	2~25N	Measure force to mate at a rate of 12.5mm per minute maximum.
3.5.7	Un-mating force	8~20N .	Measure force to unmate at a rate of 12.5mm per minute maximum.
3.5.8	Durability	No physical damage and shall meet requirements of subsequent tests.	10,000 cycles. - Mechanically Operated : 500 cycle/hour with lubricant at the lock lever mating area - Manually Operated : 200 cycle/hour
3.5.9	Vibration	No physical damage. No change to performance. No discontinuity greater than 1.0 microsecond.	Apply for 2 hours in each 3 mutually perpendicular axes(total 6 hours). Frequency=10-55-10Hz (Sweep time :1 minute max.) Amplitude=1.5mm, Current=100mA [EIA-364-28F Condition I]

3.5.10	Random Vibration	No physical damage. No change to performance. No discontinuity greater than 1.0 microsecond.	Apply for 15 minutes in each 3 mutually perpendicular axes(total 45 minutes). Frequency=50-2,000Hz Power spectral density=0.02g ² /Hz Current=100mA [EIA-364-28F Condition V Test Letter A]
Para.	Test Items	Requirements	Procedures
3.5.11	Shock	No physical damage. No change to performance. No discontinuity greater than 1.0 microsecond.	Apply 3 successive shocks in each direction along the 3 mutually perpendicular axes(total 18 shocks) Pulse shape=half sine Peak acceleration=490m/s ² (50G) Duration of pulse=11ms [EIA-364-27B Condition I]
3.5.12	Reverse Mating Strength	50N Min.	Apply a force to the connector in reverse mating condition at a rate of 12.5mm per minute maximum until the breakdown occurs or connector is inserted.
3.5.13	Soldering Strength	80N Min.	Apply a force to the connector in each parallel direction(X & Y) with PCB at a rate of 12.5mm per minute maximum until the breakdown of connector or soldering parts occurs. (Fig.5)
3.5.14	Compulsory Insertion Strength	250N Min.	Apply a force to the mated connector at a rate of 12.5mm per minute maximum until the breakdown occurs.
3.5.15	Swing wrenching durability with 1kgf (Set condition test)	No physical damage and shall meet requirements of subsequent tests.	Apply 1kgf, 10,000 cycles of swing wrenching force in each direction (horizontal & vertical) at a rate of 100mm per minute maximum. (Fig.6)
3.5.16	Swing wrenching durability with 10kgf (Set condition test)	No physical damage and shall meet requirements of subsequent tests.	Apply 10kgf, 10 cycles of swing wrenching force in each direction(horizontal & vertical) at a rate of 100mm per minute maximum. (Fig.7)
Environmental Requirements			
3.5.17	Dry cold (steady state)	No physical damage and shall meet requirement of subsequent test.	-40°C±3°C for 96 hours Recovery period 2 hours at ambient atmosphere. [MIL-STD-202 Method 108]
3.5.18	Dry heat (steady state)	No physical damage and shall meet requirement of subsequent test.	+85°C±2°C for 96 hours Recovery period 2 hours at ambient atmosphere. [MIL-STD-202 Method 108]

Para.	Test Items	Requirements	Procedures
3.5.19	Thermal Shock (change of temperature)	No physical damage and shall meet requirement of subsequent test.	Ta=-40°C for 2 hours; then change of temp.=25°C , 5minute max.; then Tb=+85°C for 2 hours. After 20cycles, cool to ambient for 2 hours.
3.5.20	Damp heat (steady state)	No physical damage and shall meet requirement of subsequent test.	120 hours at Temp. 85°C±2°C, R/H 85±5%; After test, cool to ambient temp. for 2 hours.
3.5.21	Salt spray	No physical damage and shall meet requirement of subsequent test.	48 hours spray, At temp. 35±2 °C R/H 90~95%, Salt NaCl mist 5% After test wash parts and return to room ambient for 2 hours. [EIA-364-26B]
3.5.22	Solderability	Solderable area shall have a minimum of 95% solder coverage.	255°C±5°C of lead free soler pot temperature, for 5+0/-0.5 seconds.
3.5.23	Resistance to Reflow Heat	No mechanical damage allowed.	Temperature profile;as shown in Fig.3 24hours at temp. 85±2 °C, R/H 85±5%. Recovery:0.5 hours at ambient atmosphere; then apply Reflow 3 times. (Fig.3)
3.5.24	Waterproof IPX-5	Protected against water jets	Water projected at all angles through a 6.3mm nozzle at a flow rate of 12.5 liters/min at a pressure of 30kN/m2 for 3 minutes from a distance of 3 meters.(Fig.8)
3.5.25	Waterproof IPX-8	Protected against water submersion	Submersion for 30 minutes at a depth of 1.5 meters. (Fig.8)

Fig.1(END)

The meaning of text “mechanical damage” in the table above is :

- No dimension change
- No pinhole corrosion of plating
- No general corrosion of plating
- No adhesion problem of plating
- No blistering of plating
- No flaking of plating
- No loosen parts
- No cracks on any parts

4. Product Qualification Test Sequence

Para.	Test Examination	Test Group														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Test Sequence (a)														
3.5.1	Examination of Product	1,11	1	1	1	1,9	1,5	1,3	1,5	1,5	1,9	1,7	1,5	1,7	1,6	1,6
3.5.2	Contactresistance (Low Level)	2,8				2,6	2,4		2,4	2,4			2,4	2,4	3	3
3.5.3	Insulation resistance										2,5	2,5				
3.5.4	Dielectric withstanding Voltage										3,6	3,6				
3.5.5	Temperature Rise												3			
3.5.6	Mating force	3,7														
3.5.7	Un-mating force	4,6														
3.5.8	Durability	5														
3.5.9	Vibration					3										
3.5.10	Random Vabration					4										
3.5.11	Shock					5										
3.5.12	Reverse Mating Strength		2													
3.5.13	Soldering Strength			2												
3.5.14	Compulsory Insertion Strength				2											
3.5.15	Swing wrenching durability with 1kgf														2	
3.5.16	Swing wrenching durability with 10kgf															2
3.5.17	Dry cold (steady state)								3							
3.5.18	Dry heat (steady state)									3						
3.5.19	Thermal Shock										4					
3.5.20	Damp heat(steady state)											4				
3.5.21	Salt spray						3									
3.5.22	Solderability							2								
3.5.23	Resistance to Reflow Heat													3		
3.5.24	Waterproof IPX-5	9				7					7			5	4	4
3.5.25	Waterproof IPX-8	10				8					8			6	5	5

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

Fig.2

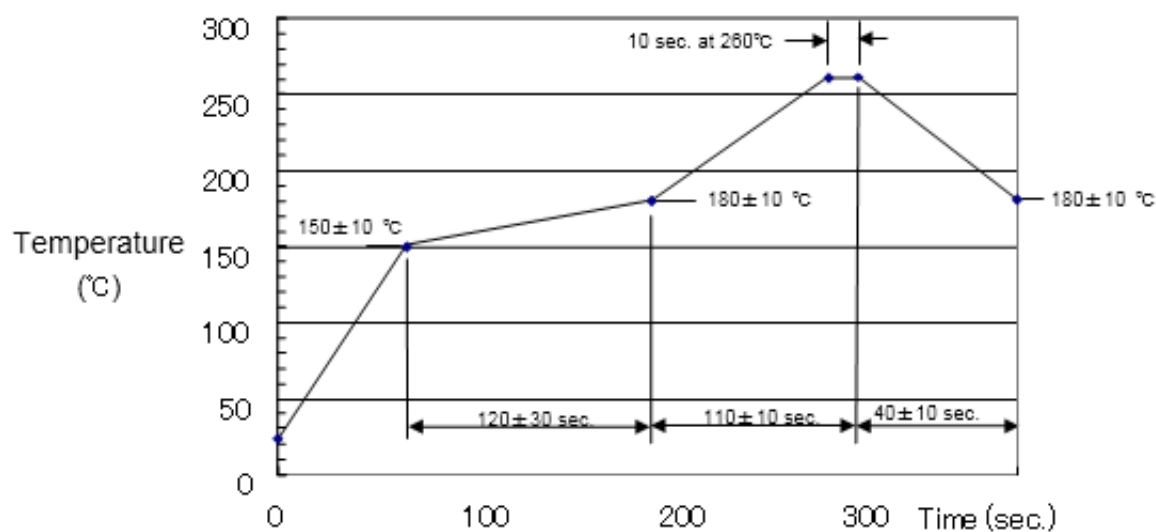


Fig.3 Reflow temperature profile

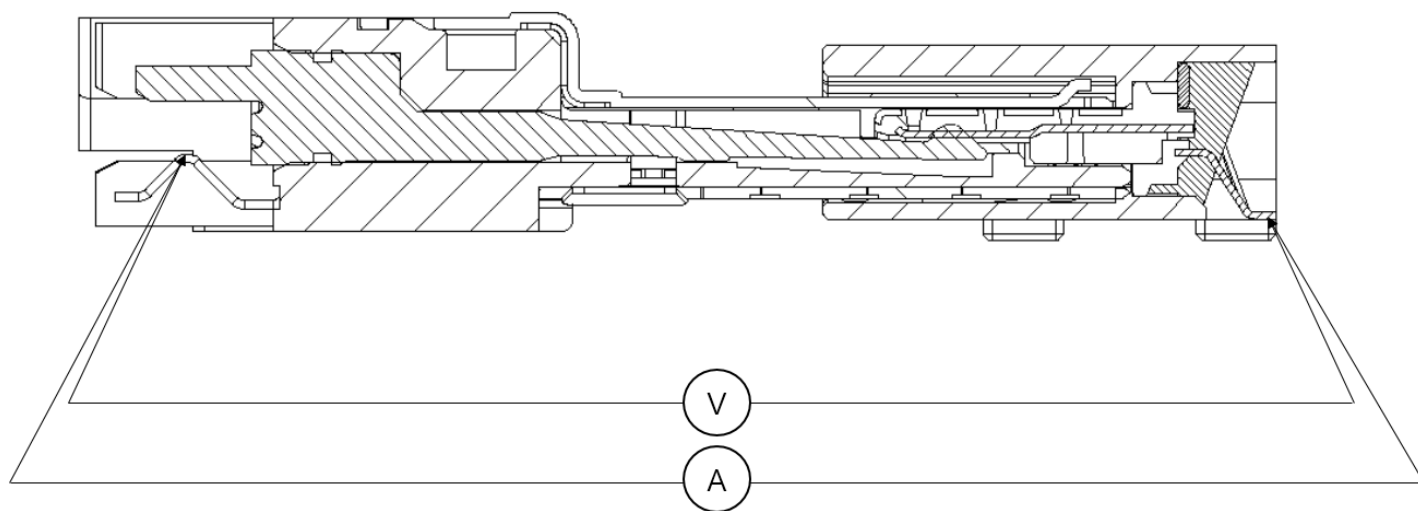


Fig.4 Termination Resistance Measuring Points

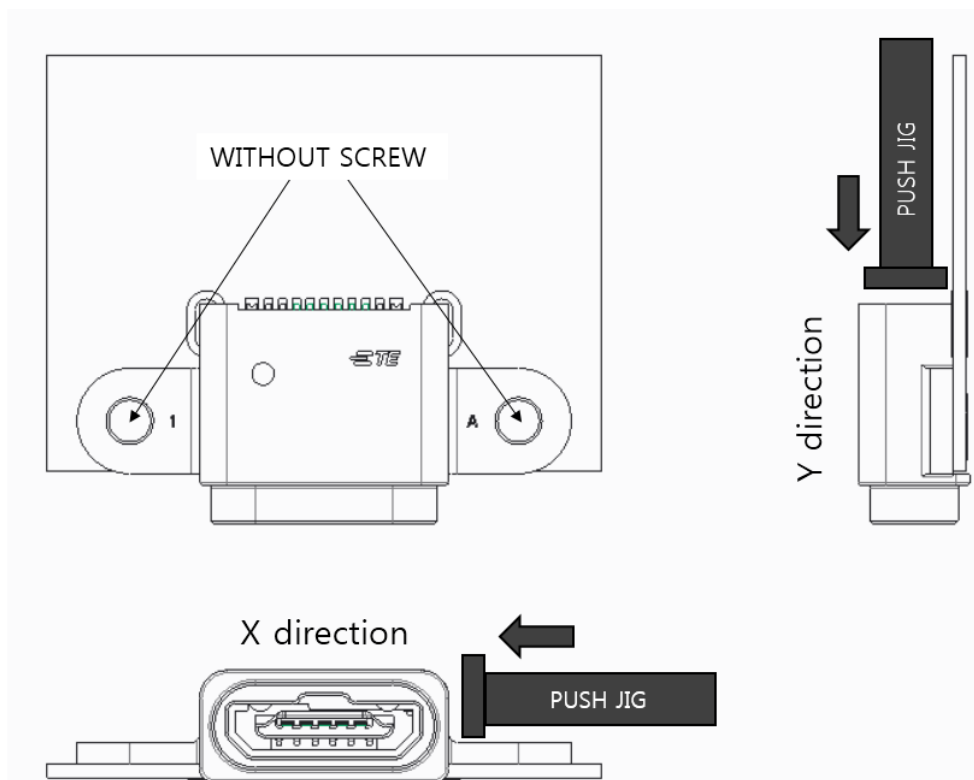


Fig.5 Soldering Strength

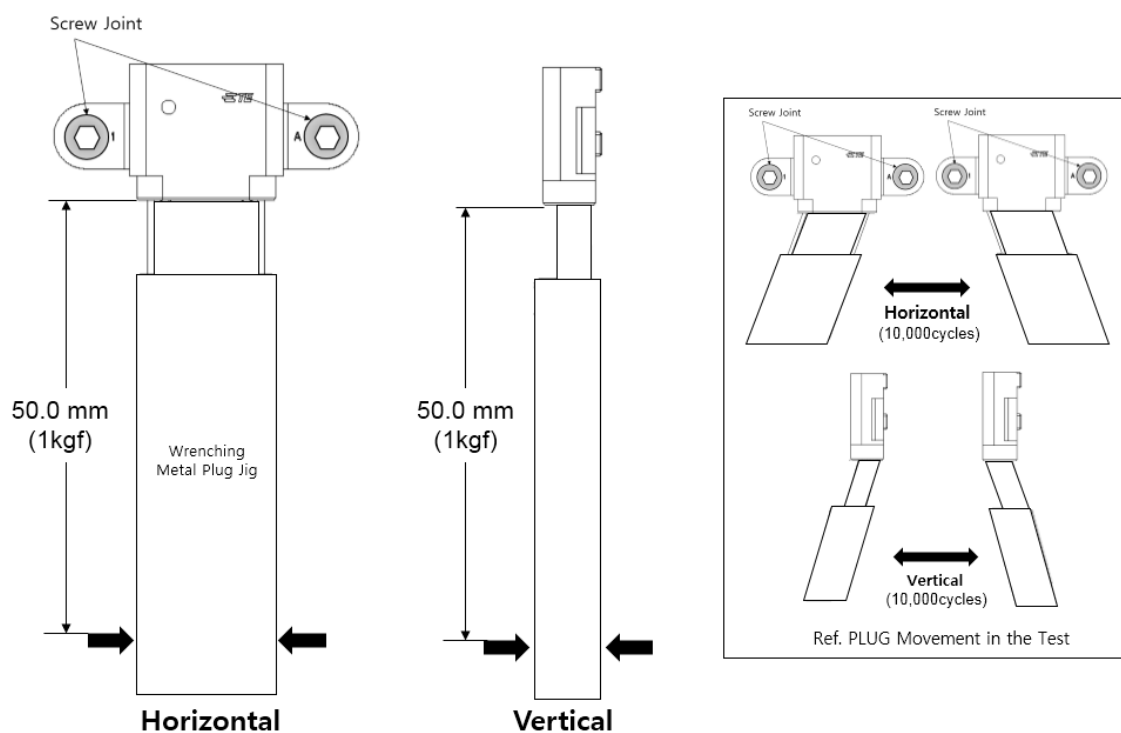


Fig.6 Swing wrenching durability with 1kgf

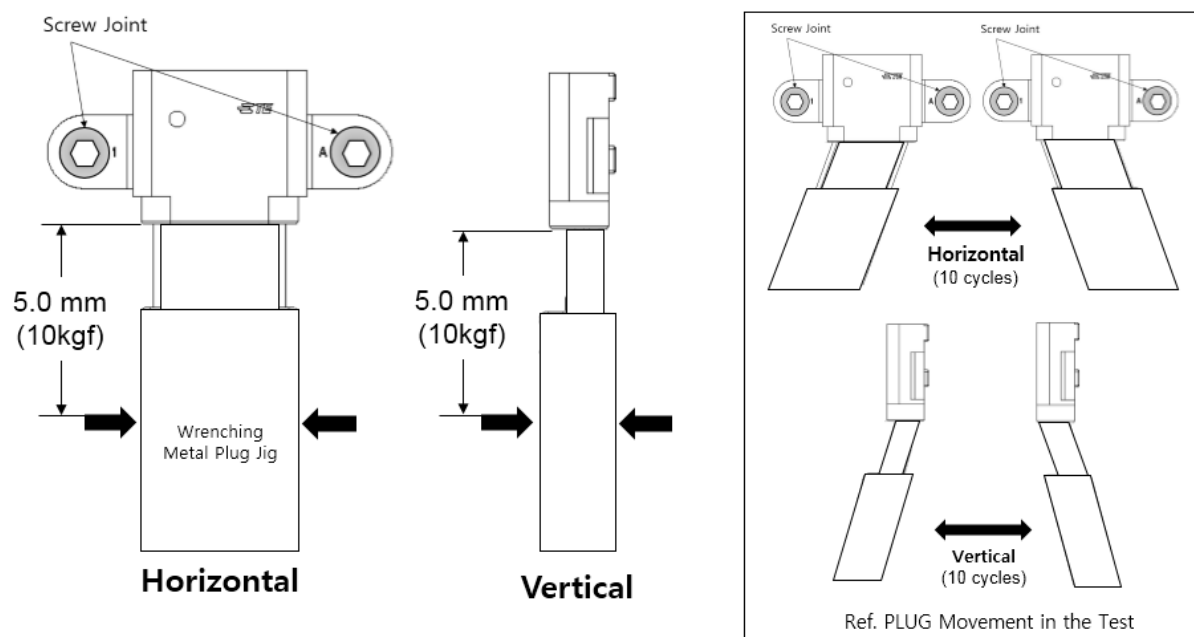


Fig.7 Swing wrenching durability with 10kgf

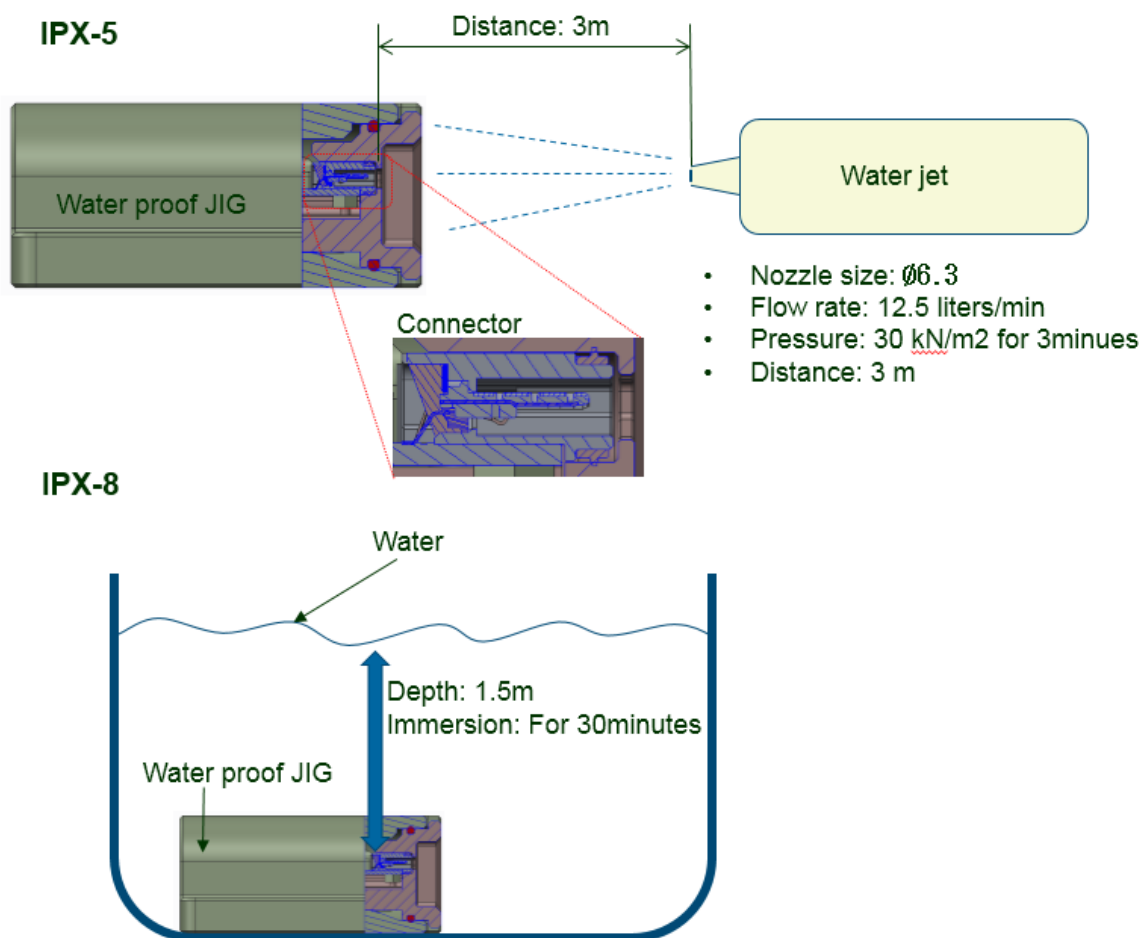


Fig.8 Waterproof test

The applicable product descriptions and part numbers are as shown in Appendix.1.

RECEPTACLE	
Description	Part Number
Micro USB Receptacle 5pos Water Proof Standard/Onboard	2108877-1
Mating Plug	
Description	Part Number
5Pos. Plug	-
Sealing	
Description	Part Number
Sealing	2108883-1

Appendix.1