

# MPronto

# Product Specification



1. Scope / 概論

A leading professional solutions provider of waterproof connectors (overmolded with cable, receptacle, field installable) in the industry, Amphenol LTW always fulfills any requirements with high functionality and reliability products; even it is a very special requirement. And it is highly recommended to be applied to harsh environment.

Amphenol LTW (ALTW) 是防水連接器計設及生產的領導者,主要包含線端,板端及現場組裝式連接器以滿足各種使用求及特殊要求,產品具有高效能及高可靠性,非常適合在各種惡劣的環境條件下提供安裝及使用。

This product specification sheet describes the product application in the markets such as Renewable Energy, Industrial Automation, LED Lighting, Marine, Broadband Wireless Access, Smart Grid, Heavy Equipment, Medical, Electrical Vehicle....etc.

本規範主要描述了 Amphenol LTW(ALTW)產品的應用要求。 本產品廣泛應用於可再生能源，工業自動化，LED，船舶，寬帶無線接入，智能電網，建築機械/重型車輛，醫療設備等，電動車行業....

2. Applicable Documents / 參考文件

2.1 Industry Document / 業界標準

Amphenol LTW (ALTW) 設計及生產的產品符合各項世界標準,包括 IEC, EIA, MIL, NMEA....

3. Specification / 規格

3.1 Material / 材質

Parts / 零件	Material / 材質
Connector / 連接器	Thermoplastic / 熱塑性塑膠
Pin / 端子	Copper Alloy / 銅合金
Nut / 螺帽	Thermoplastic / 熱塑性塑膠, Metal / 金屬
O-Ring / O 型環	Rubber / 橡膠
Gasket / 墊圈	Rubber / 橡膠
Shield/Shell / 屏蔽	Metal / 金屬

3.2 Rating / 操作評級

<p>Voltage 電壓</p>	<p>請見表 A-1 See table A-1</p> <table border="1"> <thead> <tr> <th>Size &amp; Coding</th> <th>No. of ways</th> <th>Rated voltage V</th> <th>Rated impulse voltage kV</th> </tr> </thead> <tbody> <tr> <td rowspan="3">M12 ABD Coding</td> <td>2~4</td> <td>250 V</td> <td>2.5</td> </tr> <tr> <td>5</td> <td>60 V</td> <td>1.5</td> </tr> <tr> <td>6~17</td> <td>30 V</td> <td>0.8</td> </tr> <tr> <td>M12 S Coding</td> <td>3~4</td> <td>630 V</td> <td>6</td> </tr> <tr> <td>M12 T Coding</td> <td>2~4</td> <td>63 V</td> <td>1.5</td> </tr> <tr> <td>M12 X Coding</td> <td>8</td> <td>50 V a.c. / 60 V d.c.</td> <td>0.8</td> </tr> </tbody> </table>	Size & Coding	No. of ways	Rated voltage V	Rated impulse voltage kV	M12 ABD Coding	2~4	250 V	2.5	5	60 V	1.5	6~17	30 V	0.8	M12 S Coding	3~4	630 V	6	M12 T Coding	2~4	63 V	1.5	M12 X Coding	8	50 V a.c. / 60 V d.c.	0.8
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<p>Operating Temperature 操作溫度</p>	<p>Overmolded With Cable : -25°C~85°C (攝氏-25 度~85 度) Field Installable : -40°C~105°C (攝氏-40 度~105 度)</p>																										
<p>IP 防水等級</p>	<p>Overmolded With Cable : IP68 (Mated, 1M / 24h) Field Installable : IP67 / IP68(1M/24h)</p>																										

## 4. Test Requirement/測試要求

### 4.1 Appearance/外觀

Item / 項目	Test Condition / 測試條件	Requirement / 條件需求
Examination of product 外觀檢查	IEC 60512, Test 1a Visual inspection No physical damage 檢查外觀是否有損壞	No defect would impair normal operation 沒有缺陷會影響正常操作

### 4.2 Electrical/電氣

Item / 項目	Test Condition / 測試條件	Requirement / 條件需求
Dielectric Withstanding Voltage 耐電壓試驗	IEC 60512, Test 4a, Method A Standard atmospheric conditions, Mated connectors (See table A-1) 標準大氣條件,對接連接器(請見表 A-1)	<ul style="list-style-type: none"> <li>Current leakage less than 5mA</li> <li>No physical damage, flashover, sparks, breakdown</li> <li>漏電流小於 5mA</li> <li>無物理損害,飛弧,跳火,擊穿</li> </ul>
Contact Resistance 接觸阻抗	IEC 60512, Test 2a Standard atmospheric conditions connecting points 標準大氣壓力下測試接觸點	<p>S,T code :</p> <ul style="list-style-type: none"> <li>Initial value 5 mΩ max. ;</li> <li>Rise in relation to initial values 10 mΩ max.</li> <li>初始值最大 5 mΩ , 上升變化值最大為 10mΩ。</li> </ul> <p>A,B,D code :</p> <ul style="list-style-type: none"> <li>Initial value 10 mΩ max.</li> <li>Rise in relation to initial values 15 mΩ max.</li> <li>初始值最大 10 mΩ , 上升變化值最大為 15mΩ。</li> </ul> <p>X code :</p> <ul style="list-style-type: none"> <li>Initial value 15 mΩ max.</li> <li>Rise in relation to initial values 15 mΩ max.</li> <li>初始值最大 15 mΩ , 上升變化值最大為 15mΩ。</li> </ul>
Insulation Resistance 絕緣阻抗	IEC 60512, Test 3a, Method A Standard atmospheric conditions Test voltage 500 V ± 15 V d.c. 標準大氣壓力下使用 500 V ± 15 V d.c.測試	<ul style="list-style-type: none"> <li>100MΩ min.</li> <li>100MΩ 最小</li> </ul>
Temperature Rise 溫升試驗	UL1977 section 16.1, Mated connector carry the maximum rated current (table) continuously for 4 hour and measure the temperature rise of contact.UL1977 第 16.1 節, 配合連接器連續輸入最大額定電流 (附件) 4 小時, 測量接觸溫升。	<ul style="list-style-type: none"> <li>Temperature rise <math>\Delta T</math> is no more than Relative Thermal Index of the insulating material</li> <li>溫升 <math>\Delta T</math> 不大於絕緣材料的相對熱指數</li> </ul>
	UL 2238 section 25, Mated connector carry the maximum rated current (table) continuously for 4 hour and measure the temperature rise of contact. 連接器對接後, 額定電流(附件)持續輸入 4 小時, 測量接觸點溫升。	<ul style="list-style-type: none"> <li>UL : The temperature do not exceed the RTI of insulating material.</li> <li>CUL : Temperature rise <math>\Delta T</math> is no more than 30°C , also for CUL ( CSA C22.2 No. 182.3,Clause 6.5 )</li> <li>UL: 溫度不超過絕緣材料的 RTI</li> <li>CUL: 溫度升高<math>\Delta T</math> 不超過 30°C</li> </ul>

Table A-1

Voltage proof (KV)

Size & Coding	No. of ways	Between contacts		Between contacts and metal-housing	
		Fixed connectors	Free connectors	Fixed connectors	Free connectors
<b>M12 ABD Coding</b>	2~4	1,4 KV	1,4 KV	1,4 KV	1,4 KV
	5	1,0 KV	1,0 KV	1,0 KV	1,0 KV
	6~8	0,65 KV	0,65 KV	0,65 KV	0,65 KV
	9~17	0,50 KV	0,50 KV	0,50 KV	0,50 KV
<b>M12 S Coding</b>	3~4	3.31 KV	3.31 KV	3.31 KV	3.31 KV
<b>M12 T Coding</b>	2~4	0.84 KV	0.84 KV	0.84 KV	0.84 KV
<b>M12 X Coding</b>	8	0.5 KV	0.5 KV	0.5 KV	0.5 KV

### 4.3 Mechanical/機械

Item / 項目	Test Condition / 測試條件		Requirement / 條件需求																																				
Durability 耐久性	IEC 60512, Test 9a  Standard atmospheric conditions, Max. speed of operations = 10 mm/s,  Rest:10s,unmated 最大插拔速率10mm/s, 分離狀態下停留10s		<ul style="list-style-type: none"> <li>No physical damage</li> <li>500 cycles for MPronto-12</li> <li>無物理損害</li> <li>MPronto-12 至少滿足 500 次插拔</li> </ul>																																				
Insertion Force and Withdrawal force Test 插拔力	IEC 60512, Test 13b  Standard atmospheric conditions, Max. speed of operations = 10 mm/s,  標準大氣壓下測試, 最大插拔速度為10mm/s		<table border="1"> <thead> <tr> <th>Code</th> <th>No. of ways</th> <th>Total insertion force ( maximum )</th> </tr> </thead> <tbody> <tr> <td rowspan="3">M12 A,B,D</td> <td>2~5</td> <td>30 N</td> </tr> <tr> <td>6~12</td> <td>30 N</td> </tr> <tr> <td>13~17</td> <td>30 N</td> </tr> <tr> <td rowspan="2">M12 S,T</td> <td>2~4</td> <td>30 N</td> </tr> <tr> <td>5</td> <td>45 N</td> </tr> <tr> <td>M12 X</td> <td>2~8</td> <td>30 N</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Size</th> <th>No. of ways</th> <th>Total withdrawal force ( maximum )</th> </tr> </thead> <tbody> <tr> <td rowspan="3">M12 A,B,D</td> <td>2~5</td> <td>30 N</td> </tr> <tr> <td>6~12</td> <td>30 N</td> </tr> <tr> <td>13~17</td> <td>30 N</td> </tr> <tr> <td rowspan="2">M12 S,T</td> <td>2~4</td> <td>30 N</td> </tr> <tr> <td>5</td> <td>45 N</td> </tr> <tr> <td>M12 X</td> <td>2~8</td> <td>30 N</td> </tr> </tbody> </table>	Code	No. of ways	Total insertion force ( maximum )	M12 A,B,D	2~5	30 N	6~12	30 N	13~17	30 N	M12 S,T	2~4	30 N	5	45 N	M12 X	2~8	30 N	Size	No. of ways	Total withdrawal force ( maximum )	M12 A,B,D	2~5	30 N	6~12	30 N	13~17	30 N	M12 S,T	2~4	30 N	5	45 N	M12 X	2~8	30 N
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Vibration 震動試驗	IEC 60512-6-4, Test 6d  10~500Hz, and 0.35mm or 50m/s <sup>2</sup> , sweep cycle: 10 cycle on each of the 3 axes , Full duration 6 hrs (2hrs each axis)  頻率 : 10~500Hz, 掃描周期: 每軸向做 10 個循環, 3 個軸向均需測		<ul style="list-style-type: none"> <li>No physical damages</li> <li>No electrical discontinuity more than 1μ second.</li> <li>無物理損害</li> <li>電氣訊斷不超過 1 μ second</li> </ul>																																				
Mechanical Shock 物理沖擊	M12 A,B,D,X Coding	IEC 60512-6-3, test 6c  Half sine shock acceleration 490 m/s <sup>2</sup> (50 g)  Duration of impact: 11 ms,  3shocks/axis (total 18 shocks)  半正弦衝擊加速度 490 m / s <sup>2</sup> ; 持續 11 ms	<ul style="list-style-type: none"> <li>No physical damages</li> <li>No electrical discontinuity more than 1μ second.</li> <li>無物理損害</li> <li>電氣訊斷不超過 1 μ second</li> </ul>																																				
	M12 S,T Coding	IEC 60512-6-3, test 6c  Half sine shock acceleration 500 m/s <sup>2</sup>  Duration of impact: 11 ms  半正弦衝擊加速度 500 m / s <sup>2</sup> ; 持續 11 ms	<ul style="list-style-type: none"> <li>No physical damages</li> <li>No electrical discontinuity more than 1μ second.</li> <li>無物理損害</li> <li>電氣訊斷不超過 1 μ second</li> </ul>																																				

4.4 Environmental/環境

Item / 項目	Test Condition / 測試條件	Requirement / 條件需求
Waterproof Test 防水測試	IEC 60529, IPX8 should be immersed in water at depth of at least 1 m for 24 hours. 浸入深度至少 1 米的水中 24 小時。	<ul style="list-style-type: none"> <li>• No physical damages</li> <li>• Visual inspection inside no water</li> <li>• Insulation resistance: &gt;100MΩ</li> <li>• 無物理損壞</li> <li>• 目視內部無水侵入</li> <li>• 絕緣電阻：&gt;100MΩ</li> </ul>
Rapid change of temperature 溫度變化	IEC 60512-11d - 25 °C to 85 °C, t = 30 min, 5 cycles - 25 °C to 85 °C, 時間 30 min, 5 個循環	<ul style="list-style-type: none"> <li>• No physical damages</li> <li>• 無物理損壞</li> </ul>
Salt Spray 鹽水噴霧試驗	EIA-364-26, 5% salt solution for 500 hours mated. 對插狀態，5%鹽水溶液持續 500 小時。	<ul style="list-style-type: none"> <li>• No physical damages</li> <li>• 無物理損壞</li> </ul>

#### 4.5 High Frequency

##### D Code

Item / 項目	Test Condition / 測試條件	Requirement / 條件需求
Insertion Loss 插入損失	M12 Channel Cat 5e DTX-CHA021	Meet Fluke: DTX-1800 Cat 5e requirement.
NEXT Loss 近端串線干擾	M12 Channel Cat 5e DTX-CHA021	Meet Fluke: DTX-1800 Cat 5e requirement.
Return Loss 反射損失	M12 Channel Cat 5e DTX-CHA021	Meet Fluke: DTX-1800 Cat 5e requirement.

##### X Code

Item / 項目	Test Condition / 測試條件	Requirement / 條件需求
Insertion Loss 插入損失	M12 Channel Cat 5e DTX-CHA021	Meet Fluke: DTX-1800 Cat 6A requirement.
NEXT Loss 近端串線干擾	M12 Channel Cat 5e DTX-CHA021	Meet Fluke: DTX-1800 Cat 6A requirement.
Return Loss 反射損失	M12 Channel Cat 5e DTX-CHA021	Meet Fluke: DTX-1800 Cat 6A requirement.

#### 5. Product Qualification Test Sequence/測試群組及順序

	Test or Examination	Test Group					
		A	B	C	D	E	F
Examination of product	Visual Examination	1,10	1,7	1,3	1,9	1,3	
Electrical 電氣	Contact Resistance	2,7	2,6				
	Insulation Resistance	3,8			2,7		
	Dielectric Withstanding Voltage	4,9			3,8		
	Temperature Rise Test			2			
Mechanical 機械	Insertion Force and Withdrawal force Test		3,5				
	Durability		4				
	Vibration Test	5					
	Mechanical Shock	6					
Environmental 環境	Rapid change of temperature				5		
	Salt Spray					2	
	Waterproof Test				4,6		
High Frequency 高頻	Insertion loss						1
	Next loss						2
	Return loss						3
Number of test samples 測試樣品數量		6	6	6	6	6	6

\*Test group "F" are applicable for D-Coding connector for symmetrical pair cabling, the measurements shall be performed with one pair connected to the contacts 1 and 3 and the other pair connected to the contacts 2 and 4.



6. Quality Assurance Provisions/品質保證

Unless otherwise specified, in the contract or purchase order, we will be responsible for the quality of the part as it is delivered to client. We will be responsible for having controlled processes to ensure product is in total compliance with this specification. Failing lots shall be subject to return or other corrective action.

除非在合同或採購訂單中另有規定者外，我們將對交付給客戶的部件質量負責。我們將負責控制流程，以確保產品完全符合規格。未通過的批次應退回或採取其他糾正措施。

**Re-qualification Testing : 重新資格測試**

If changes significantly affecting form, fit or function 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.

如果對產品或製造過程產生顯著影響的形狀，配合或功能的變化，產品保證應協調重新認證測試，包括由開發/產品，質量和可靠性工程確定的全部或部分的原始測試順序。

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7. Revision/版本

Revision	ECN NO.	Description	Date	Sign
A		New Item	2020/10/26	Sam Ho
B		Modify Insertion Force and Withdrawal force & Salt Spray	2020/12/03	Sam Ho
C		Update	2021/09/09	Sam Ho
D		Update	2021/09/28	Sam Ho
E		Update MPronto X Code High Frequency	2024/05/10	Sam Ho