



The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.

## MTII INJECTOR 2P

### 1. SCOPE

#### 1.1. Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of MTII INJECTOR 2P

#### 1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

#### 1.3. Qualification Test Results

Successful qualification testing on the subject product line has not been completed. The Qualification Test Report number will be issued upon successful qualification testing.

### 2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

#### 2.1. TE Documents

- 1743486 : CUSTOMER DRAWING FOR MTII INJECTOR 2P PLUG ASSY

### 3. REQUIREMENTS

#### 3.1. Design and Construction

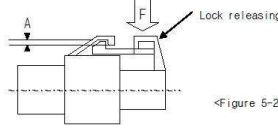
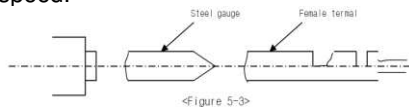
Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

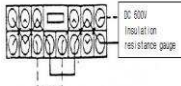
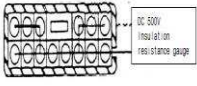
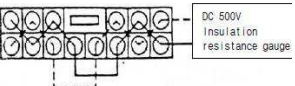
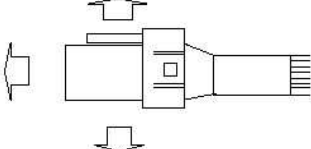
#### 3.2. Ratings

Voltage	Temperature	Humidity
12V DC	25±5°C	60±20%

## 3.3. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

TEST DESCRIPTION	REQUIREMENT		PROCEDURE	
Appearance	No crack, damage, distortion are permitted		Using sense of sight and touch.	
CONN engage and disengage force	Max. 18 kgf and less		Measure force by inserting and disengaging the connector with terminal assembled at constant 50 mm/min speed. However, remove lock part when measuring disengage force.	
Reverse insertion between housings	It shall not be incorrectly inserted by applying force of 5kgf.		Insert the housing with terminal by pushing it in reverse direction with applying 5kgf.	
Reverse insertion between terminal and HSG	It shall not be incorrectly inserted by applying force of 5kgf.		Crimp cable of maximum size on terminal and then insert it into housing by end of insulation barrel in the reserve direction with applying 5kgf.	
Insertion force between terminal and HSG	Max. 1.5kgf		Insert terminal into fixed HSG at 50mm/min speed	
Strength of HSG lock	Min. 10kgf		Combine housing only, fix the one side of housing in completely locked condition, and extend the other side in axial direction and 30 degree direction at a constant speed of 50mm/min. Then measure weight when lock structure is disengaged or destroyed.	
HSG lock releasing force	Max. 6kgf		Apply force (F) to lock releasing part, and measure weight on the point of A=0. However, cut connector and then perform test at the section in order to secure visibility. 	
Terminal retention force	040	Min. 8kgf	Fix the housing after inserting crimped terminals. Extend one line of cable in axial direction at a speed of 50mm/min at a position 50~100mm away from crimped part, and measure weight when terminal is disengaged from the housing.	
	090	Min. 10kgf		
Engage and disengage force of terminal	Engage force	040	0.2~0.8kgf	As shown in figure 5-3, engage and disengage male terminal or steel gauge into or from female terminal at 100 mm/min speed. 
		090	0.3~1.0kgf	
	Disengage force	040	0.15~0.8kgf	
		090	0.15~1.0kgf	
Crimp strength	040	0.3SQ	Min. 6kgf	Fix the crimped terminal, and draw the cable at a position 50~100mm away from crimped part in axial direction at 100 mm/min speed. Then measure the weight when cable is cut or disengaged from the crimped part.
		0.5SQ	Max. 9kgf	
	090	0.3SQ	Min. 6kgf	
		2.0SQ	Max. 20kgf	

Voltage drop	040	Max. 5mV/A		<p>Measure the circuit voltage drop (V) by sending voltage and current described in the table 5-1 with terminal combined on the connector. Then calculate a voltage drop (VD) in terminal by subtracting cable resistance (L) from the circuit voltage drop (V).</p> <p>1) HARNESS versus UNIT:VD =V-(L3+L4 )</p> <table border="1"> <thead> <tr> <th>Application</th> <th>Open voltage</th> <th>Short circuit current</th> <th>Division</th> </tr> </thead> <tbody> <tr> <td>Signal circuit</td> <td>20 ± 5 mV</td> <td>10 mA</td> <td>ECU, Sensor</td> </tr> <tr> <td>Power circuit</td> <td>13 V</td> <td>1 A</td> <td>Other than the above</td> </tr> </tbody> </table> <p>&lt;Table5-1&gt;</p>	Application	Open voltage	Short circuit current	Division	Signal circuit	20 ± 5 mV	10 mA	ECU, Sensor	Power circuit	13 V	1 A	Other than the above
	Application	Open voltage	Short circuit current		Division											
Signal circuit	20 ± 5 mV	10 mA	ECU, Sensor													
Power circuit	13 V	1 A	Other than the above													
	090	Max. 3mV/A														
Insulation resistance	Between terminals	Min 100 MΩ		<p>Measure resistance between neighbor terminals (figure 5-6), and between terminal and housing surface (figure 5-7) with DC 500V insulation resistance gauge with connector combined.</p>   <p>&lt;Figure 5-6: Between neighboring terminals&gt; &lt;Figure 5-7: Between neighboring terminal and housing surface&gt;</p>												
	Between housing surface															
Leakage current		10 μA or less		<p>Measure it by applying DC 14V between neighboring terminals (figure 5-6).</p>  <p>&lt;Figure 5-6: Between neighboring terminals&gt;</p>												
High voltage test		No allowed insulation breakdown		<p>Measured by applying test potential of 1000 V AC for 1 minutes between the adjacent contact between the contact and housing.</p>												
Temperature rise		Max. 30 °C		<p>Apply basic current (I=I0*K) of clause 4.3 to the connector with electrodes in series in the room free from wind (normal temperature). And measure a temperature of crimped part after reaching saturation temperature. Then calculate a temperature of crimped part by subtracting ambient temperature from the temperature.</p>												
Twisting Test - Connector Engage and Disengage Endurance Test	Appearance	No crack, damage, distortion are permitted		<p>Apply 8kgf force on the end part of combined connector 10 times each in the (front, rear, left, right) directions perpendicular to axial direction.</p> <p>Make combine connectors engage and disengage at 100mm/min. Perform it 50 times. (Do not use locking device)</p>												
	Voltage drop	Max. 10mV/A														
Cold temperature test	Appearance	No crack, damage, distortion are permitted		<p>Engage and disengage connector with terminal assembled 10 times with hands, and leave it in temperature chamber of -40 °C for 120 hours. Make connector engaged and disengaged 5 times immediately, and drop it onto the concrete surface from 1m height 3 times in the direction of figure 6-1. (Voltage drop &amp; Temperature rise test perform at normal temperature) :</p>  <p>&lt;Figure 6-1&gt;</p>												
	Voltage drop	Max. 10mV/A														
	Insulation resistance	Between terminals	Min. 10k Ω													
		Between housing surface														
	Current leakage	Max. 1mA														
Temperature rise	Max. 40 °C ( 040 : 2.4A / 090 : 5.4A )															

Overcurrent cycle test	Appearance	No crack, damage, distortion are permitted		Engage and disengage connector with terminal assembled 10 times with hands, and apply the following current 1000 cycles for the connector with electrodes in series at 60°C of ambient temperature.											
	Voltage drop	Condition A	Max. 10mV/A												
		Condition B													
Temperature rise	Condition A	Max. 40 °C													
	Condition B														
		<table border="1"> <tr> <td rowspan="2">Current application condition A</td> <td>Applied current</td> <td>2 times of basic current</td> </tr> <tr> <td>Current application time</td> <td>1 minute - ON, 9 minutes - OFF</td> </tr> <tr> <td rowspan="2">Current application condition B</td> <td>Applied current</td> <td>5 times of basic current</td> </tr> <tr> <td>Current application time</td> <td>10 seconds - ON, 590 seconds - OFF</td> </tr> </table>		Current application condition A	Applied current	2 times of basic current	Current application time	1 minute - ON, 9 minutes - OFF	Current application condition B	Applied current	5 times of basic current	Current application time	10 seconds - ON, 590 seconds - OFF		
Current application condition A	Applied current	2 times of basic current													
	Current application time	1 minute - ON, 9 minutes - OFF													
Current application condition B	Applied current	5 times of basic current													
	Current application time	10 seconds - ON, 590 seconds - OFF													
Cold and hot temperature shock test	Appearance	No crack, damage, distortion are permitted		Engage and disengage connector with terminal assembled 10 times with hands, and leave it in combined state at -40°C for 2 hours, and perform 200 cycles according of the method specified in the figure 6-2. Then leave it at room temperature for 2 hours or more (*) follows table 6-1)											
	Voltage drop	Max. 10mV/A													
		<p>(*)</p> <p>Normal temperature</p> <p>-40°C</p> <p>T1 T2 T1 T2</p> <p>1 CYCLE</p> <p>T1 &lt; 5 minutes</p> <p>T2 = 1 hour</p>		<p>&lt; Figure 6-2 : Test pattern &gt;</p> <table border="1"> <tr> <th>Division</th> <th>High temperature (*)</th> <th>Connector using part</th> </tr> <tr> <td>A</td> <td>120°C</td> <td>waterproof connector</td> </tr> <tr> <td>B</td> <td>80°C</td> <td>Non-waterproof connector</td> </tr> </table> <p>&lt; Table 6-1 &gt;</p>		Division	High temperature (*)	Connector using part	A	120°C	waterproof connector	B	80°C	Non-waterproof connector	
Division	High temperature (*)	Connector using part													
A	120°C	waterproof connector													
B	80°C	Non-waterproof connector													
High temperature test	Appearance	No crack, damage, distortion are permitted		Engage and disengage connector with terminal assembled 10 times with hands, and leave it in combined state at the temperature chamber of the table 6-1 for 300 hours. Then pick it out and leave it until it returns to normal temperature.											
	Voltage drop	Max. 10mV/A													
		<table border="1"> <tr> <th>High temperature(+)</th> <th>Connector using part</th> </tr> <tr> <td>80°C</td> <td>Non-waterproof connector</td> </tr> </table>		High temperature(+)	Connector using part	80°C	Non-waterproof connector								
High temperature(+)	Connector using part														
80°C	Non-waterproof connector														
Temperature humidity test	Appearance	No crack, damage, distortion are permitted		Engage and disengage connector with terminal assembled 10 times with hands, and leave it at 25°C ambient temperature and 65% relative humidity for 25 hours. And perform 5 cycles of the method specified in figure 6-3											
	Voltage drop	Max. 10mV/A													
	Insulation resistance	Between terminals	Min. 10k Ω												
		Between housing surface													
Current leakage	Max. 1mA														
		<p>(°C)</p> <p>60±2°C, 90±5%RH</p> <p>45±2°C, 96±5%RH</p> <p>25±2°C, 65±10%RH</p> <p>-10±2°C</p> <p>2hr 4hr 2hr 1hr 2hr 1hr 2hr 1hr</p> <p>1 CYCLE</p>		<p>&lt; Figure 6-3 : Test pattern &gt;</p>											
Dust test	Voltage drop	Max. 10mV/A		Engage and disengage connector with terminal assembled 10 times with hands, and diffuse 1.5kg Portland cement(JIS R5210) with fan (or others) for 10 seconds per 15 minutes while maintaining 150mm distance from wall in the closed container of 900~1200mm length, width and height, with connector combined. After 1 hour, measure it.											

Oil and liquid test	Appearance	No crack, damage, distortion are permitted		<p>Perform test each sample with connector combined.</p> <p>A. Immerse connector in combined state for 2 hours in mixed oil of 50± 2°C ENG oil (SAE10W) or equivalent oil and</p> <p>B. Immerse connector in combined state for 1 hour in car gasoline (JIS K2202) at normal temperature, and then pick it out.</p> <p>C. Immerse connector in combined state for 1 hour in brake liquid (pure product) at normal temperature, and then pick it out.</p> <p>D. Immerse connector in combined state for 1 hour in 100% washer liquid (pure product) at normal temperature, and then pick it out.</p> <p>E. Immerse connector in combined state for 1 hour in 50% LLC (Long life coolant) at normal temperature, and then pick it out.</p>
	Voltage drop	Max. 10mV/A		
Ozone test	Appearance	No crack, damage, distortion are permitted		
	Voltage drop	Max. 10mV/A		
Sulfur (SO <sub>2</sub> ) gas test	Appearance	No crack, damage, distortion are permitted		
	Voltage drop	Max. 10mV/A		
Complex environment endurance test	Appearance	No crack, damage, distortion are permitted		
	Crimp tensile strength	040	0.3SQ	Min. 6kgf
			0.5SQ	Max. 9kgf
		090	0.3SQ	Min. 6kgf
			2.0SQ	Max. 20kgf
	Voltage drop	Max. 10mV/A		
Temperature rise	Max. 40 °C ( 040 : 2.4A / 090 : 5.4A )			
Instant short circuit	Max. 10μS			

Engage and disengage connector with terminal assembled 10 times with hands, and leave it in combined state in the temperature chamber of 80°C for 48 hours. And then perform the following vibration test. Then measure instant short circuit according to the method of below for X, Y, Z each. Follow figure 6-7 for connector attaching method.

<Figure 6- 7 Connector attaching method>

■ Vibration test A (for non-waterproof connector)

Division	Condition
Ambient temperature/humidity	80°C, 90~95%
Applied current	Basic current (Connector electrodes in series.)
Current application cycle	120 CYCLE (45 minutes-ON, 15 minutes-OFF)
Vibration acceleration	4.4g
Frequency	20Hz ~ 200Hz (sweep time: 3 minutes or less)

			<table border="1"> <tr> <td>Vibration time</td> <td>40 hours for X, Y, Z each</td> </tr> <tr> <td>Connector attaching method</td> <td>Test mode A, B, C</td> </tr> </table>	Vibration time	40 hours for X, Y, Z each	Connector attaching method	Test mode A, B, C						
Vibration time	40 hours for X, Y, Z each												
Connector attaching method	Test mode A, B, C												
			<table border="1"> <thead> <tr> <th>Breakpoint (Hz)</th> <th>Magnitude (G/Hz)</th> </tr> </thead> <tbody> <tr> <td>60.0</td> <td>0.00100</td> </tr> <tr> <td>200.0</td> <td>1.50000</td> </tr> <tr> <td>210.0</td> <td>0.10000</td> </tr> <tr> <td>1000.0</td> <td>0.10000</td> </tr> </tbody> </table> <p>&lt;Figure 6- 8 : X, Y, Z vibration direction&gt;</p>	Breakpoint (Hz)	Magnitude (G/Hz)	60.0	0.00100	200.0	1.50000	210.0	0.10000	1000.0	0.10000
Breakpoint (Hz)	Magnitude (G/Hz)												
60.0	0.00100												
200.0	1.50000												
210.0	0.10000												
1000.0	0.10000												

3.4. Applied Part No List

TE Part no	Description
1743486-3	MTII INJECTOR 2P PLUG ASSY