



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.

090 16P

1. SCOPE

1.1. Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of 090 16P

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

- 936277 : Customer Drawing (090 16P CAP ASSY (V-TYPE))
- 936201 : Customer Drawing (090III 16P PLUG ASSY)

3. REQUIREMENTS

3.1. Design and Construction

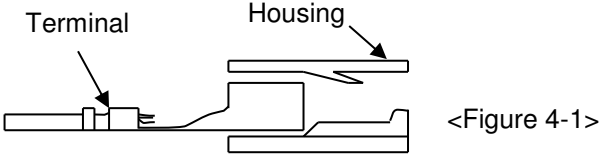
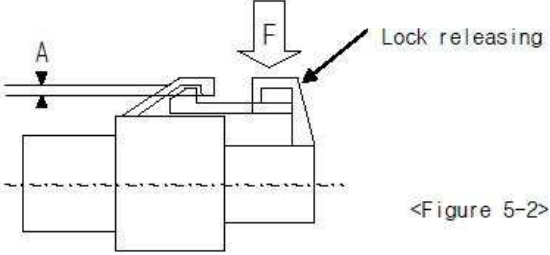
Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

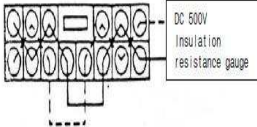
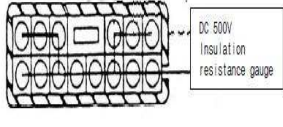
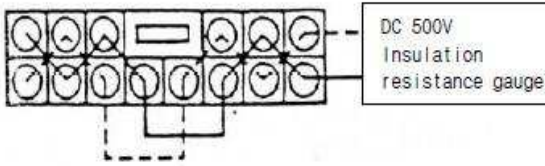
3.2. Ratings

Voltage	Temperature	Humidity
12V DC	25±5°C	65±20%

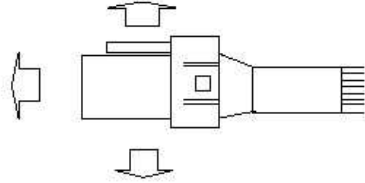
3.3. Test Requirements and Procedures Summary

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

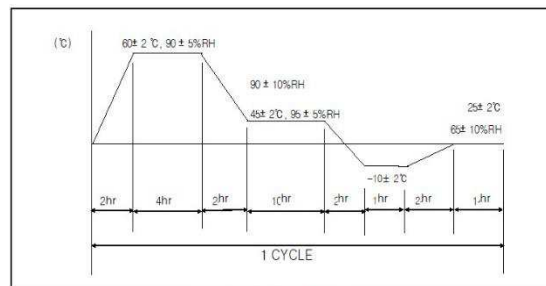
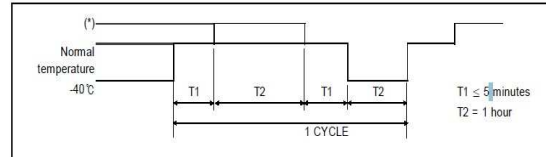
TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Appearance	No crack, damage, distortion are permitted	Using sense of sight and touch.
CONN engage and disengage force	15kgf or less	Measure force by inserting and disengaging the connector with terminal assembled at constant 100 m/min speed. However, remove lock part when measuring disengage force.
Reverse insertion between housings	It shall not be incorrectly inserted by applying force of 20kgf.	1) Insert terminal to housing 2) Fix housing of female connector to moving part of measuring instrument in reverse insertion direction. (Reverse insertion: 180 degree rotation on the locking part) 3) Set a measuring instrument to stop at force of 20kgf and insert that. At this moment, monitor resistance of one terminal matched to identify current carrying between terminals. 4) Check the insertion by housing modification of male connector after connector insertion.
Engage force between terminal and housing	Max 1.5kgf or less	As shown in the following figure 4-1, measure the weight while inserting terminal into fixed housing at 50mm/min speed. 
Strength of HSG lock	Min 10kgf or more	Combine housing only, fix the one side of housing in completely locked condition, and extend the other side in axial direction and 30 angle direction at a constant speed of 100mm/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. 
Voltage Drop	Max 3mV/A	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>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>$20 \pm 5 \text{ mV}$</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><Table5-1></p>		Application	Open voltage	Short circuit current	Division	Signal circuit	$20 \pm 5 \text{ mV}$	10 mA	ECU, Sensor	Power circuit	13 V	1 A	Other than the above
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Signal circuit	$20 \pm 5 \text{ mV}$	10 mA	ECU, Sensor												
Power circuit	13 V	1 A	Other than the above												
Insulation resistance	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><Figure 5-6: Between neighboring terminals> <Figure 5-7: Between neighboring terminal and housing surface></p>													
Leakage current	10 μA or less	<p>Measure it by applying DC 13V between neighboring terminals (figure 5-6).</p>  <p><Figure 5-6: Between neighboring terminals></p>													
High voltage test	No allowed insulation breakdown	<p>Measured by applying test potential of 1000 V AC between the adjacent contact between the contact and housing.</p>													
Temperature rise	Max 30°C	<p>Apply basic current ($I = I_0 * K$) of clause 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>												
	Max 10mV/A														
Overcurrent cycle test	Appearance	No crack, damage distortion are permitted	<p>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.</p> <table border="1"> <tbody> <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> </tbody> </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		
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Voltage Drop	Max 10mV/A	Condition A													
		Condition B													
Temp rise		Condition A													

		Max 40°C	Condition B					
Cold temperature test	Appearance	No crack, damage, distortion are permitted		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 & Temperature rise test perform at normal temperature) :				
	Voltage Drop	Max 10mV/A						
	Insulation Resistance	Min 100kΩ	Between terminals housing surface					
	Current Leakage	Max 1mA						
Cold and hot temperature shock test	Appearance	No crack, damage, distortion are permitted		Engage and disengage Connector with terminal assembled 10 times with hands, this repeats 200 CYCLE by below test condition. (Non-Sealed : 80°C)				
	Voltage Drop	Max 10mV/A						
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
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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. Then pick connector out of chamber and dry it for 2 hours or more.				
	Voltage Drop	Max 10mV/A						
	Insulation Resistance	Min 10 kΩ	Between terminals housing surface					
	Current Leakage	Max 1mA						
Dust Test	Appearance	No crack, damage, distortion are permitted		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				



<Figure 6-1>



< Figure 6-3 : Test pattern >

	Voltage Drop	Max 10mV/A		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		Engage and disengage connector with terminal assembled 10 times with hands, and perform test each sample with connector combined. A. Immerse connector in combined state for 2 hours in mixed oil of 50±2°C ENG oil (SAE10W) or equivalent oil and B. Immerse connector in combined state for 1 hour in car gasoline (JIS K2202) at normal temperature, and then pick it out. C. Immerse connector in combined state for 1 hour in brake liquid (pure product) at normal temperature, and then pick it out. D. Immerse connector in combined state for 1 hour in 100% washer liquid (pure product) at normal temperature, and then pick it out. E. Immerse connector in combined state for 1 hour in 50% LLC (Long life coolant) at normal temperature, and then pick it out.																
	Voltage Drop	Max 10mV/A																		
Sulfur (SO ₂) gas test	Appearance	No crack, damage, distortion are permitted		Engage and disengage connector with terminal assembled 10 times with hands, and expose it in combined state to sulfur gas of 40±3°C, density 10ppm, humidity 90~95%, for 24 hours. Then pick connector out of chamber and dry it for 2 hours or more.																
	Voltage Drop	Max 10mV/A																		
Complex environment endurance 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 in the temperature chamber of 120°C or 80°C (follows table 7) for 48 hours. And then perform the following vibration test. Then measure instant short circuit according to the method of clause 4.16 for 4 hours for X, Y, Z each. 1) Sin Wave Test																
	Crimp Tensile Strength	2.5SQ	Min 25kgf																	
	Voltage Drop	Max 10mV/A																		
	Temperature Rise	Max 40°C																		
	Instant short circuit	Max 10μs																		
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3.4. Applied Part No List

TE Part no	Description
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0-936227-2	090 16P CAP ASSY (V-TYPE)
0-936227-1	090 16P CAP ASSY (V-TYPE)
0-936201-1/2/3/4/5/6/7/8	090III 16P PLUG ASSY