



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.

040III MLC 44P

1. SCOPE

1.1. Content

This specification covers the requirements for product performance, test methods and quality assurance provisions of 040III MLC 44P

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

- 936460 : Customer Drawing (44POS. CAP ASSEMBLY(WIRE TO BOARD) .040III MULTI LOCK CONNECTOR)
- 936473 : Customer Drawing (20POS PLUG HOUSING ASS'Y 040 III MLC CONN)
- 936475 : Customer Drawing (24POS PLUG HOUSING ASS'Y 040 III MLC CONN)

3. REQUIREMENTS

3.1. Design and Construction

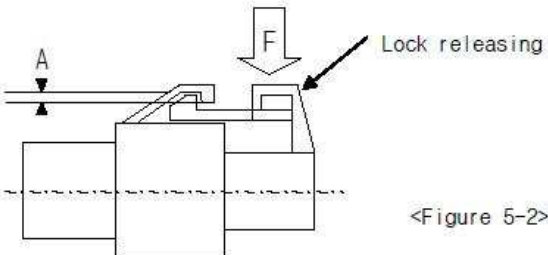
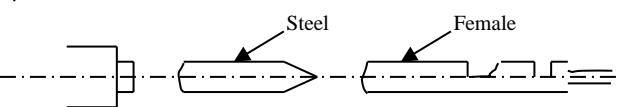
Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing.

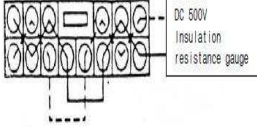
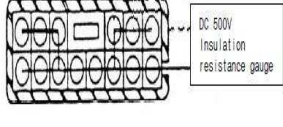
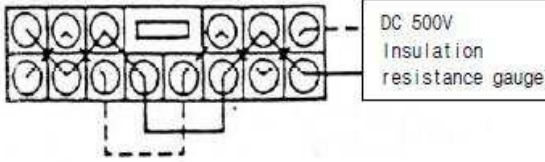
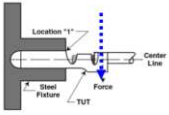
3.2. Ratings

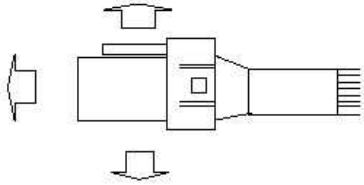
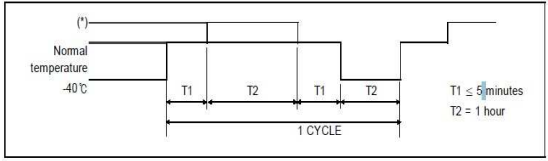
Voltage	Temperature	Humidity
12V DC	25±5°C	65±20%

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	936473(20P) 15kgf or 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.
	936475(24P) 18kgf or less		
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.
Strength of HSG lock	Min 8kgf 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 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 engage and disengage force (kgf)	Engage	0.2~0.8kgf	As shown in figure 4-3, engage and disengage male terminal or steel gauge into or from female terminal at 50 mm/min speed. 
	Disengage	0.15~0.8kgf	
Voltage Drop	Max 5mV/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 14V 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>												
Terminal bending strength	Terminals should not be torn. When bent material stretched to its original state, it should not be torn or cracked.	<p>Terminal is ready to sample. As shown in the figure, makes fixed. After applying force on 15 seconds, expand at least 10 bent portion and scans. The new sample was fixed to rotate 90,180 degrees and then is measured in the same way. According to the thickness of raw material, apply power to the table below.</p>  <table border="1"> <thead> <tr> <th>Terminal Material Thickness(mm)</th> <th>Applied Force</th> </tr> </thead> <tbody> <tr> <td>≤ 0.20</td> <td>0.4kgf</td> </tr> <tr> <td>≤ 0.30</td> <td>1kgf</td> </tr> <tr> <td>≤ 0.40</td> <td>1.5kgf</td> </tr> <tr> <td>≥ 0.40</td> <td>2kgf</td> </tr> </tbody> </table>	Terminal Material Thickness(mm)	Applied Force	≤ 0.20	0.4kgf	≤ 0.30	1kgf	≤ 0.40	1.5kgf	≥ 0.40	2kgf		
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Connector coupling sounds	Connector coupling sound : 65dB(A) or more	<p>Put sound measurement equipment on $350 \pm 50 \text{ mm}$ away from the connector. Measure the peak sound that occurs when you combine the connector. Sounds unit: dB(A)</p>												
Twisting Test - Connector Engage and Disengage Endurance Test	Appearance	No crack, damage, distortion are permitted												
	Max 10mV/A		<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>											
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</p>											

	<table border="1"> <tr> <td rowspan="2">Voltage Drop</td> <td rowspan="2">Max 10mV/A</td> <td>Condition A</td> </tr> <tr> <td>Condition B</td> </tr> <tr> <td rowspan="2">Temp rise</td> <td rowspan="2">Max 40°C</td> <td>Condition A</td> </tr> <tr> <td>Condition b</td> </tr> </table>	Voltage Drop	Max 10mV/A	Condition A	Condition B	Temp rise	Max 40°C	Condition A	Condition b	<table border="1"> <tr> <td colspan="3">temperature.</td> </tr> <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>	temperature.			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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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 & Temperature rise test perform at normal temperature) :</p>  <p><Figure 6-1></p>																			
	Voltage Drop	Max 10mV/A																					
	Insulation Resistance	Min 100 MΩ	Between terminals																				
	Current Leakage	Max 1 μA																					
	Temperature Rise	Max 40°C																					
Cold and hot temperature shock test	Appearance	No crack, damage, distortion are permitted		<p>Engage and disengage Connector with terminal assembled 10 times with hands, this repeats 200 CYCLE by below test condition. (Non-Sealed : 80°C)</p> 																			
	Voltage Drop	Max 10mV/A																					
High 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 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.</p> <table border="1"> <tr> <td>High Temperature</td> <td>Connector Using Part</td> </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		<p>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.</p>																			
	Voltage Drop	Max 10mV/A																					
	Insulation Resistance	Min 100 MΩ	Between terminals																				
	Current Leakage																						

		Max 1 μ A		<p>< Figure 6-3 : Test pattern ></p>		
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 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.		
	Voltage Drop	Max 10mV/A				
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				
Ozone Test	Appearance	No crack, damage, distortion are permitted		Engage and disengage Connector with terminal assembled 10 times with hands, and samples keep at 40°C and 50±5pphm Ozone for 100hour. Then pick connector out of chamber and dry it for 2hours or more.		
	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	0.3SQ	Min 6kgf			
		0.5SQ	Min 9kgf			
Voltage Drop	Max 10mV/A					
				<table border="1"> <tr> <td>Division</td> <td>Condition</td> </tr> </table>	Division	Condition
Division	Condition					

	Temperature Rise	Max 40°C	Ambient temperature/humidity	Refer to figure 4-8, 90~95%
	Instant short circuit	Max 10 μ s	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)
			Vibration time	40 hours for X, Y, Z each
			Connector attaching method	Test mode A, B, C

3.4. Applied Part No List

TE Part no	Description
0-936460-1	44POS. CAP ASSEMBLY(WIRE TO BOARD) .040III MULTI LOCK CONNECTOR)
0-936473-1/2/5/6/7/8	20POS PLUG HOUSING ASS'Y 040 III MLC CONN
0-936475-1/2/5/6/7/8	24POS PLUG HOUSING ASS'Y 040 III MLC CONN