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# TEST / CALIBRATION REPORT

## Type Test Report
## for
## MECO Moving Coil AC Panel Meter

Testing as per IS 1248 : 1993 (Category II)


**ELECTRONICS REGIONAL TEST LABORATORY (WEST)**

**MINISTRY OF COMMUNICATIONS & INFORMATION TECHNOLOGY, (STQC Dte.)**

**Government of India**

Plot No. F 7 & 8, MIDC Area, Opp.SEEPZ,
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## MEMORANDUM

The Test/Calibration Report issued by ERTL (W) is a record of the measurements conducted on the products submitted to it for testing / calibration and the results thereof. Unless otherwise specified in the report, the results are applicable only to those products which have been tested / calibrated and do not apply to other products even though declared to be identical.

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## LIABILITY CLAUSE

1. ERTL (W) shall not be liable for any change in test / calibration data and performance specification on account of malfunctioning of the standard / instrument / equipment due to any damage caused to it after the report, in respect of it has been issued.

2. The reprot shall not be regarded in any way diminishing the normal contractual responsibilites / obligations between the customer and ERTL (W).

3. The results reported in this report are valid only at the time of and under the stated conditions of the measurements.

| ELECTRONICS REGIONAL TEST LABORATORY (WEST)<br>MINISTRY OF INFORMATION TECHNOLOGY (STQC Dte.) | REPORT NO. ERTL(W)/2002E&S287 | | |
|---|---|---|---|
| SUBJECT: TYPE TESTING OF MOVING COIL PANEL METER | DATE<br>6 NOV 2003 | PAGE<br>1 | OF<br>11 |

1. **SCOPE**

1.1 Service Request No : ERTL(W) / 20022611 dated 31-Dec.-2002

1.1.1 Service Request finalised on : 31-Dec.-2002.

1.2 Requested by
(Name and address of organisation) : MECO INSTRUMENTS PVT LTD.,
301, BHARAT INDUSTRIAL EASTATE,
T.J. ROAD, SEWREE (W),
MUMBAI – 400 015.

1.3

| Description | Qty | Manufacturer | Model | Serial Nos. |
|---|---|---|---|---|
| MOVING COIL AC PANEL METER,<br>0 – 5 A AC.<br>CLASS - 1.5 | 03 Nos. | MECO | C 96 | 7610/2 - SAMPLE 1 (S-1)<br>1244/3 - SAMPLE 2 (S-2)<br>1245/3 - SAMPLE 3 (S-3)<br>**2nd set of samples**<br>2045/3 - SAMPLE 1 (S-1)<br>2046/3 - SAMPLE 2 (S-2)<br>2047/3 - SAMPLE 3 (S-3) |

1.4 Test specifications : TYPE TEST AS PER IS 1248:1993,
CATEGORY II

1.5 Lab Ambient : Temperature : (25 ±2) deg.C
Humidity : (55 ±5) % RH

1.6 Test Equipment used :

| | | |
|---|---|---|
| 1. | Calibration System | S&C/138 |
| 2. | D.M.M | E&S/120 |
| 3. | Digital Insulation Tester | E&S/121 |
| 4. | Energy Meter Calibrator | E&S/125 |
| 5. | W/I Auto Tester | E&S/066 |
| 6. | Environmental Chamber | ENV/042 |
| 7. | Environmental Chamber | WK 1000-2 |
| 8. | Vibration Machine | ENV/008 |
| 9. | Shock Test Machine | ENV/018 |

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## 2.0 Test Results

| Sr.No. | Test/Parameter | Test Condition | Requirement | Observation | | | Remark |
|---|---|---|---|---|---|---|---|
| 2.1 | Insulation Resistance | At 500 V DC for 1 min. between terminals shorted together and body. | Not less than 5 M ohm | S-1 | S-2 | S-3 | Complied |
| | | | | > 2000 M ohm | > 2000 M ohm | > 2000 M ohm | |
| 2.2 | High Voltage Test | AT 3 kV AC rms for 1 min. between terminals shorted together and foil wrapped on body. | There shall not be any breakdown/ flashover. | No breakdown or flashover observed in case of any of the 3 samples | | | Complied |
| 2.3 | Intrinsic Error | At following equidistant points | Class index (1.5%) | S - 1 | S - 2 | S - 3 | Complied |
| | | 1 A | | 0.2 % | 0 % | -0.4 % | |
| | | 2 A | | 0 % | 0 % | -0.2 % | |
| | | 3 A | | -0.2 % | -0.4 % | 0 % | |
| | | 4 A | | -0.2 % | 0 % | 0.2 % | |
| | | 5 A | | -0.6 % | -0.6 % | 0 % | |
| 2.4 | Variation due to influencial quantities | | | | | | |
| 2.4.1 | Variation due to ambient temp. | Lower temp. 10 deg. C, Upper temp. 37 deg.C Intrinsic error checked at following equidistant points. | Permissible variation shall be 100% of class index | S-1 | S-2 | S-3 | Complied |
| | | 1 A | | -0.2 % | 0.2 % | 0.2 % | |
| | | 2 A | | -0.4 % | 0.2 % | 0.2 % | |
| | | 3 A | | -0.2 % | 0.2 % | 0.2 % | |
| | | 4 A | | -0.4 % | -0.2 % | 0.2 % | |
| | | 5 A | | -0.2 % | 0.6 % | 0.2 % | |

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| Sr.No. | Test/Parameter | Test Condition | Requirement | Observation | | | Remark |
|---|---|---|---|---|---|---|---|
| 2.4.2 | Variation due to humidity | Lower Relative humidity 25%, Upper Relative humidity 80% Intrinsic error checked at following equidistant points | Permissible variation shall be 100% of class index | | | | Complied |
| | | 1 A | | 0.2 % | -0.2 % | 0.2 % | |
| | | 2 A | | 0.8 % | 0.4 % | -0.4 % | |
| | | 3 A | | 0.8 % | 0 % | -0.2 % | |
| | | 4 A | | 0.6 % | -0.2 % | -0.2 % | |
| | | 5 A | | 0.6 % | -0.2 % | 0.2 % | |
| 2.4.3 | Variation due to distortion of AC measured quantity | Superimpose 20 % of third harmonics up on the fundamental wave form.. | Permissible variation shall be 100% of class index | 0.8% | 0.2 % | 0.4% | Complied |
| 2.4.4 | Variation due to frequency of AC measured quantity | Frequency varied from 45 Hz to 55 Hz. | Permissible variation shall be 100% of class index | | | | Complied |
| | | 1 A | | -0.6 % | -0.2 % | -0.2 % | |
| | | 2 A | | -0.4 % | 0.2 % | 0.2 % | |
| | | 3 A | | -0.2 % | -0.2 % | -0.2 % | |
| | | 4 A | | -0.4 % | -0.2 % | -0.2 % | |
| | | 5 A | | -0.4 % | -0.2 % | -0.2 % | |

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| Sr.No | Test/Parameter | Test Condition | Requirement | Observation | | | Remark |
|---|---|---|---|---|---|---|---|
| | | | | S-1 | S-2 | S-3 | |
| 2.4.5 | Variation due to position | Intrinsic error to be measured at reference plane and then at 5 deg. Inclination plane in forward, backward, left & right direction. Maximum deviation at following equidistant points | Permissible variation shall be 50% of class index | | | | Complied |
| | | 1 A | | 0.2 % | - 0.2 % | 0.2 % | |
| | | 2 A | | 0.4 % | - 0.2 % | -0.2 % | |
| | | 3 A | | 0.2 % | - 0.2 % | -0.2 % | |
| | | 4 A | | 0.2 % | - 0.2 % | 0 % | |
| | | 5 A | | 0.6 % | - 0.2 % | 0.2 % | |
| 2.4.6 | Variation due to magnetic field of external origin | AC excitation of upper limit under an external magnetic field of 0.4kA/m. Maximum deviation to be observed. | 6 % of fiducial value | 0.8 % | 0.8 % | 0.6 % | Complied |
| 2.4.7 | Variation due to ferromagnetic supports | Accuracy test carried out by mounting UUT on Non Ferrous Panel (PVC) & Ferrous Panel at following equidistant points | Within the limit of intrinsic error | | | | Complied |
| | | 1 A | | 0.2 % | 0.0 % | 0 % | |
| | | 2 A | | 0.2 % | 0.4 % | 0 % | |
| | | 3 A | | 0 % | 0.2 % | -0.2 % | |
| | | 4 A | | 0.4 % | 0.4 % | 0.2 % | |
| | | 5 A | | 0.2 % | -0.2 % | 0.2 % | |

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| Sr.No. | Test/Parameter | Test Condition | Requirement | Observation | | | Remark |
|---|---|---|---|---|---|---|---|
| 2.4.8 | Variation due to conductive supports | Accuracy test carried out by mounting UUT on conductive support following equidistant points | Shall meet the requirement of intrinsic error | | | | Complied |
| | | 1 A | | -0.8 % | 0 % | -0.8 % | |
| | | 2 A | | -0.8 % | 0.2 % | -0.4 % | |
| | | 3 A | | -0.8 % | -0.4 % | -0.2 % | |
| | | 4 A | | -0.8 % | 0 % | 0.2 % | |
| | | 5 A | | -1.0 % | -0.8 % | -0.2 % | |
| 2.5 | Damping | | | | | | |
| 2.5.1 | Mechanical overshoot | By suddenly applying 2/3rd of measuring range & note down the % overshoot. | Shall not exceed 20% of scale length | 16% | 16 % | 8 % | Complied |
| 2.5.2 | Response time | By suddenly applying 2/3rd of measuring range & note down time (sec). | Within 1.5% scale length after 4 s. | Indices reached the position of rest within 4s in each case | | | Complied |
| 2.6 | Self Heating | By applying 90% of upper limit of measuring range for 30 to 35 min. & note down the deviation (%) | Shall comply with the requirements of class index. | S-1 | S-2 | S-3 | Complied |
| | | | | 0.4 % | 0.4 % | 0.2 % | |
| 2.7 | Continuous overload | a) By applying 120% of upper limit for 2h<br>b) Accuracy test at following equidistant points after 2 h. | a) Residual deflection shall not exceed 1% of scale length<br>b) Shall comply with the accuracy requirement. | No residual deflection observed | | | Complied |
| | | | | S-1 | S-2 | S-3 | |
| | | 1 A | | -0.8 % | 0 % | 0.2 % | |
| | | 2 A | | -0.6 % | 0.2 % | 0 % | |
| | | 3 A | | -0.4 % | 0.2 % | 0 % | |
| | | 4 A | | -0.4 % | 0.2 % | 0.4 % | |
| | | 5 A | | -0.4 % | 0.2 % | 0 % | |

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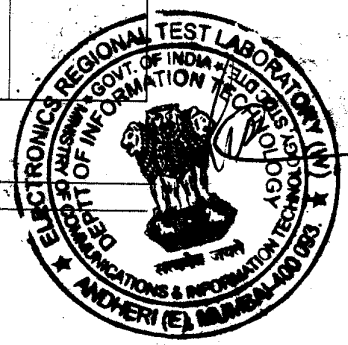

| Sr.No. | Test/Parameter | Test Condition | Requirement | Observation | | | Remark |
|---|---|---|---|---|---|---|---|
| 2.8 | Overloads of short duration | a) Apply 50 A AC for 0.5s nine times at an interval of 60s and once for 5s.<br>b) Accuracy test at the following equidistant points : | a) Deviation of index from zero scale mark shall not exceed 0.5% of scale length<br>b) Shall comply with accuracy requirements. | No deviation observed on any of the three samples. | | | Complied |
| | | | | S-1 | S-2 | S-3 | |
| | | 1 A | | -0.6% | -0.2 % | -0.4 % | |
| | | 2 A | | -0.4 % | -0.2 % | -0.2 % | |
| | | 3 A | | -0.2 % | 0 % | -0.2 % | |
| | | 4 A | | -0.4 % | 0 % | 0.2 % | |
| | | 5 A | | -0.2 % | 0.2 % | -0.2 % | |
| 2.9 | Environmental Tests | | | | | | |
| 2.9.1 | Temp. cycling | 55 deg.C for 16h & -10 deg.C for 8h. 3 cycles while at 80% of the upper limit of excitation. During the last cycle at the end of 16h and while at high temp. slowly increase & decrease the excitation until index reaches the upper limit of measuring range & return to zero. Similarly after 8h at lower temp. slowly increase & decrease the excitation until index reaches the upper limit of measuring range & return to zero. | To be conditioned | Conditioned<br>Indices were responding to excitation change. | | | ----- |
| 2.9.2 | Post Measurement Intrinsic error | At the following equidistant points : | Error shall be within class index (1.5%) | S-1 | S-2 | S-3 | Complied |
| | | 1 A | | 0 % | 0.2 % | -0.8 % | |
| | | 2 A | | -0.2 % | 0.2 % | -0.8 % | |
| | | 3 A | | -0.4 % | -0.2 % | -1.2 % | |
| | | 4 A | | -0.8 % | -0.6 % | -1.0 % | |
| | | 5 A | | -1.2 % | -1.2 % | -1.2 % | |

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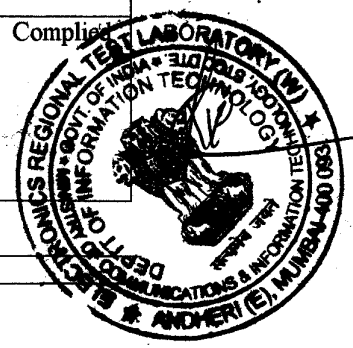

| Sr.No. | Test/Parameter | Test Condition | Requirement | Observation | | | Remark |
|---|---|---|---|---|---|---|---|
| 2.9.3 | Damp Heat Cyclic Test | As per IS 9000. Part 5 Sec. 1 (16+8) h) cycle.<br>2 cycles. Recovery 24 h. | To be conditioned | Conditioned | | | ---- |
| 2.9.4 | Post Measurement Intrinsic error | At the following equidistant points :<br>1 A<br>2 A<br>3 A<br>4 A<br>5 A | Class index (1.5%) | S - 1<br>-0.2 %<br>-0.2 %<br>0 %<br>-0.2 %<br>-0.4 % | S - 2<br>0.8 %<br>1.0 %<br>0.4 %<br>0.8 %<br>-0.2 % | S - 3<br>-1.2 %<br>-1.2 %<br>-1.2 %<br>-1.0 %<br>-1.2 % | Complied |
| 2.10 | Deviation from zero | Energise the samples for 30s at upper limit of measuring range. Quickly reduce the excitation to zero. Deviation from zero shall be measured 15s after the excitation has been reduced to zero. | Deviation expressed as percentage of scale length shall not exceed more than 50% of class index. | No deviation observed in any of the three samples. | | | Complied |

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| Sr.No. | Test/Parameter | Test Condition | Requirement | Observation | | | Remark |
|---|---|---|---|---|---|---|---|
| 2.11 | Vibration test | As per IS 9000 Part 8<br>Sweep range: 10-150-10 Hz<br>Displacement amplitude: 0.15 mm peak in the range 10-60 Hz, Acceleration: 2g in the range: 60-150 Hz,<br>Sweep Rate: 1 octave/min.,<br>Duration : 6 h.<br>Endurance shall be performed at resonance frequency. Vibration shall be applied at the resonance frequency for 6h in that direction. If the resonance is observed in any of these 3 directions, the equipment shall be subjected to vibration at each of the frequencies 25, 50, 100 and 150 Hz in each of the 3 mutually perpendicular direction so that the total duration shall not exceed 6 h. | To be conditioned | Conditioned<br>No visual damage observed | | | ---- |
| 2.12 | Accuracy Test (Post Vibration) | At the following equidistant points : | Error shall not deviate more than 50% of class index | S-1 | S-2 | S-3 | Not Complied |
| | | 1 A | | 3.2 % | 0.6 % | 4.6 % | |
| | | 2 A | | 1.2 % | 0.6 % | 3.6 % | |
| | | 3 A | | 1.8 % | 0.6 % | 3.8 % | |
| | | 4 A | | 0.8 % | 0.4 % | 4.4 % | |
| | | 5 A | | 0.2 % | 0.2 % | 5.2 % | |

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| Sr.No. | Test/Parameter | Test Condition | Requirement | Observation | | | Remark |
|---|---|---|---|---|---|---|---|
| **Test results of 2nd set of samples** | | | | | | | |
| 2.13 | Vibration test | As per IS 9000 Part 8<br>Sweep range: 10-150-10 Hz<br>Displacement amplitude: 0.15 mm peak in the range 10-60 Hz, Acceleration: 2g in the range: 60-150 Hz,<br>Sweep Rate: 1 octave/min.,<br>Duration : 6 h.<br>Endurance shall be performed at resonance frequency. Vibration shall be applied at the resonance frequency for 6h in that direction. If the resonance is observed in any of these 3 directions, the equipment shall be subjected to vibration at each of the frequencies 25, 50, 100 and 150 Hz in each of the 3 mutually perpendicular direction so that the total duration shall not exceed 6 h. | To be conditioned | Conditioned<br>No visual damage observed | | | ---- |
| 2.14 | Accuracy Test (Post Vibration) | At the following equidistant points :<br>1 A<br>2 A<br>3 A<br>4 A<br>5 A | Error shall not deviate more than 50% of class index | S-1<br>0.4 %<br>0 %<br>0 %<br>0.4 %<br>0.2 % | S-2<br>0.2 %<br>0 %<br>0.2 %<br>0.2 %<br>0.2 % | S-3<br>0.4 %<br>0.4 %<br>0.2 %<br>0.2 %<br>0 % | Complied |

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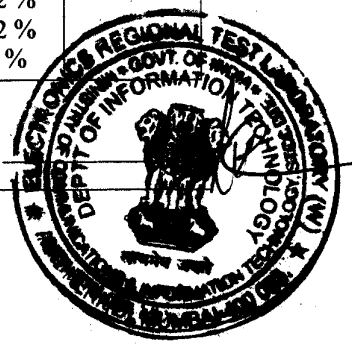

| Sr.No. | Test/Parameter | Test Condition | Requirement | Observation | | | Remark |
|---|---|---|---|---|---|---|---|
| 2.15 | Shock Test | As per IS 9000 P-7, Peak Acceleration: 15g, Pulse shape: half sine, Duration: 11 ms, 3 shocks in both directions of 3 mutually perpendicular axes (total 18 shocks) | To be conditioned | Conditioned | | | ----- |
| 2.16 | Accuracy Test (Post Shock) | At the following equidistant points : | Error after test shall not deviate by more than 100% of class index from the original values measured before shock test. | S-1 | S-2 | S-3 | Complied |
| | | 1 A | | 0.2 % | 0.2 % | 0.4 % | |
| | | 2 A | | 0.2 % | 0.6 % | 0.2 % | |
| | | 3 A | | 0 % | 0.2 % | 0.4 % | |
| | | 4 A | | 0 % | 0.2 % | 0.4 % | |
| | | 5 A | | 0 % | 0.2 % | 0.2 % | |
| 2.17 | Life Test | The UUT shall be subjected to 1,50,000 full scale deflections, the impulse supplied being of such amplitude that the pointer reaches max. value of the scale without impinging on the end stop. ON for 1 sec OFF for 4 sec during one cycle. | To be conditioned | Conditioned | | | ----- |
| 2.18 | Accuracy Test (Post Life Test) | At the following equidistant points : | Error shall be within class index (1.5 %) | S-1 | S-2 | S-3 | Complied |
| | | 1 A | | -0.4 % | 0.8 % | 0.2 % | |
| | | 2 A | | -0.2 % | 1.0 % | 0 % | |
| | | 3 A | | -0.4 % | 0.8 % | 0 % | |
| | | 4 A | | 0.2 % | 1.0 % | 0.6 % | |
| | | 5 A | | -0.2 % | 0.8 % | -0.2 % | |

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3.0 **General Remarks** :

3.1 The sample S1 and S3 failed to meet deviation requirement at test Sr. No. 2.12. Further set of fresh 3 samples submitted by customer.

3.2 The fresh set 3 samples tested from test Sr. No. 2.13 and result are reported.

**REPORT APPROVED BY**

**REPORT**

**HEAD (E&S)**

ELECTRONICS REGIONAL TEST LABORATORY (W) DEPTT OF INFORMATION TECHNOLOGY MINISTRY OF COMMUNICATIONS & INFORMATION TECHNOLOGY ANDHERI (E), MUMBAI-400 093.

# OUR ACCREDITATION STATUS

ERTL (W) set up under the STQC Directorate, Ministry of Communications & Information Technology, Govt. of India has been accreditated under number of national / international systems as follows :

| SYSTEM | AREA | STATUS |
|---|---|---|
| **IECQ**<br>(International Electro-technical Commission on Quality Assessment System for Electronic Components) | **Component Testing**<br>• Resistors (Fixed)<br>• Capacitors (Fixed) | Accreditated as ITL (Independent Test Laboratory) |
| **NABL (C), India**<br>National Accreditational Board for Test & Calibration laboratories (Calibration System) | **Calibration**<br>• Electro-technical discipline<br>• Thermal discipline<br>• Mechanical discipline | Accreditated Calibration Laboratory |
| **NABL(T), India**<br>National Accreditational Board for Test & Calibration laboratories (Testing System) | Electronic & Electrical Testing | Accreditated Test Laboratory |
| **IECEE-CE-Scheme** | • Mains Operated Electronic Consumer Products | Approved as a CB test Laboratory |
| **Other recognisation** | | Recognised by CSPO of State Govt., DOT, Naval Docyard, LCSO etc. |