**SCOPE 22ЛИ**

**Sofia, 17.01.2024**

**Delta Instruments Ltd.**

**Calibration Laboratory of Measurement Equipment for Electrical Quantities**

**Management and laboratory address:**

1616 Sofia, Boyana, Vitosha district, 20, 732 Str.

**To perform calibrating of:**

| **Type of the scope:** *Fixed* | | | | | |
| --- | --- | --- | --- | --- | --- |
| **№** | **Measuring Instrument** | **Measure and, Measure**  **ment Unit** | **Measurement Range** | **Measurement**  **Uncertainty** | **Calibration Method** |
| **1** | **2** | **3** | **4** | **5** | **6** |
| 1. | DC Voltmeters | DC Voltage, V | 20 mV to 100 mV  100 mV to 1 V  1 V to 10 V  10 V to 100 V  100 V to 1000 V | 1,6.10-2 mV to 3,0.10-2 mV  3,0.10-2 mV to 1,3.10-4 V  1,2.10-4 V to 2,5.10-3 V  2,5.10-3 V to 1,3.10-2 V  1,3.10-2 V to 0,2 V | CP-702-02-06/2019 |
| 2. | AC Voltmeters  (50 Hz) | AC Voltage, V | 0,2 V to 1 V  1 V to 10 V  10 V to 100 V  100 V to 1000 V | 4.10-4 V to 1,5.10-3 V  1,5.10-3 V tо 1,5.10-2 V  1,5.10-2 V to 0,16 V  0,16 V to 1,9 V | CP-702-02-06/2019 |
| 3. | DC Ammeters testers | DC current, А | 0,2 mA to 2 mA  2 mA to 20 mA  20 mA to 200 mA  0,2 A to 2 А  2 A to 10 А | 3,2.10-4 to 2,7.10-3 mA  2,7.10-3 mA to 2,7.10-2 mA  2,7.10-2 mA to 0,24 mA  2,4.10-4 A to 2,7.10-3 A  2,7.10-3 A to 0,014 A | CP-702-02-06/2019 |
| 4. | AC Ammeters testers  (50 Hz) | AC current, А | 2 mA to 20 mA  20 mA to 200 mA  0,2 A to 2 А  2 A to 10 А | 1,3.10-2 mA to 0,071 mA  0,071 mA to 0,6 mA  6,0.10-4 A to 7.10-3 A  7.10-3 A to 0,052 A | CP-702-02-06/2019 |
| 5. | DC resistance meters (Ohmmeters) | Electrical Resistance, Ω | 0,5 Ω to 10 Ω  10 Ω to 100 Ω  100 Ω to 1000 Ω  1 kΩ to 10 kΩ  от 10 kΩ to 100 kΩ | 1.10-4 x R + 6 mΩ  3.10-4 x R + 4 mΩ  3.10-4 x R + 4 mΩ  3.10-4 x R  3.10-4 x R | CP-702-02-03/2018 |
| 6. | Earth testers  (Instruments for measuring the parameters of electrical installations by earth resistance) | Electrical Resistance, Ω | 0,5 Ω tо 1 Ω  1 Ω tо 20 Ω  20 Ω tо 200 Ω  200 Ω tо 2000 Ω | 10 mΩ  10 mΩ  5.10-4 x R  5.10-4 x R | CP-702-02-05/2018 |
| 7. | Loop impedance testers  (Instruments for measuring the parameters of electrical installations by loop resistance) | Electrical Resistance, Ω | 0,1 Ω tо 19,99 Ω  20 Ω tо 200 Ω | 2,5.10-3 x R + 0,05 Ω  1.10-3 x R + 0,09 Ω | CP-702-02-04/2018 |
| 8. | Residual-current device (RCD testers) by contact voltage (Instruments for measuring the parameters of electrical installations by contact voltage) | AC Voltage, V | 0,1 V to 9,99V  10 V to 49,9 V  50 V to 90 V | 5.10-2 x U + 0,1 V  6.10-2 x U + 0,02 V  5,2.10-2 x U + 0,6 V | CP-702-02-02/2018 |
| 9. | Residual-current device (RCD testers) by tripping current (Instruments for measuring the parameters of electrical installations by tripping current) | AC current, А | 10 mA  30 mA  100 mA  300 mA  500 mA | 0,1 mA  0,1 mA  0,2 mA  1 mA  2 mA | CP-702-02-02/2018 |
| 10. | Insulation testers | Electrical Resistance, Ω | 1 kΩ, 10 kΩ, 100 kΩ  1 MΩ, 10 MΩ,100 MΩ  1 GΩ, 10 GΩ  100 GΩ  1 TΩ | 5.10-4 x R  15.10-3 x R  15.10-3 x R  5.10-2 x R  5.10-2 x R | CP-702-02-01/2018 |
| 11. | Instruments for measuring the parameters of electrical installations by tripping time | Time,  s | 10 ms  30 ms  100 ms  200 ms | 0,8 ms  1 ms  1 ms  1 ms | CP-702-02-07/2023 |
| 12. | AC/DC Current clumps | AC current,  (50Hz)  А | 2 mA to 20 mA  20 mA to 200 mA  200 mA to 2 A  2 A to 10 A | 0,02 mA to 0,08 mA  0,08 mA to 0,95 mA  0,95 mA to 0,01 А  0,01 А to 0,1 А | CP-702-02-08/2023 |
| AC current,  (50Hz)  А | 10 А to 100 А  100 А to 500 А  500 А to 950 А | 0,1 А to 1,0 А  1,0 А to 4,7 А  4,7 А to 8,3 А |
| DC current,  А | 10 А to 100 А  100 А to 500 А  500 А to 950 А | 0,1 А to 0,8 А  0,8 А to 4,0 А  4,0 А to 7,9 А |

**References:**

|  |  |
| --- | --- |
| CP-702-02-01/2018 | Calibration Procedure of measurement equipment for electrical quantities in insulation resistance (megohmmeters, meggers, insulation testers). |
| CP-702-02-02/2018 | Calibration Procedure of measurement equipment for electrical quantities in trip current of RCDs and contact voltage. |
| CP-702-02-03/2018 | Calibration Procedure of measurement equipment for electrical quantities in resistance. |
| CP-702-02-04/2018 | Calibration Procedure of measurement equipment for electrical quantities in loop impedance. |
| CP-702-02-05/2018 | Calibration Procedure of measurement equipment for electrical quantities in ground resistance. |
| CP-702-02-06/2019 | Calibration Procedure of measurement equipment for electrical quantities in direct current and voltage, alternating current and voltage. |
| CP-702-02-07/2023 | Calibration Procedure of measurement the parameters of the electrical installations for tripping time. |
| CP-702-02-08/2023 | Calibration Procedure of measurement current clupms. |

**Note 1:** Calibration of all measuring instruments is carried out at the laboratory premises.

**Note 2:** Calibrated measuring instruments may be stand-alone or part of combined devices (including multimeters).

**Note 3:** Insulation resistance measuring devices can be megohmmeters, meggers and insulation testers.

**Note 4:** Calibrated measuring instruments may be analogue or digital.