

## 4.2.05-00 Coulomb potential and Coulomb field of metal spheres



## What you can learn about ...

- Electric field
- Field intensity
- Electric flow
- Electric charge
- Gaussian rule
- Surface charge density
- Induction
- Induction constant
- Capacitance
- Gradient
- Image charge
- Electrostatic potential
- Potential difference

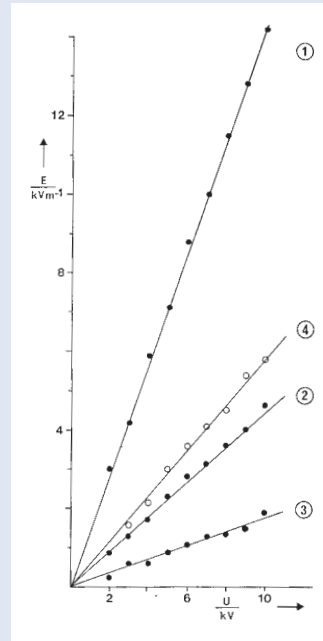
## Principle:

Conducting spheres with different diameters are charged electrically. The static potentials and the accompanying electric field intensities are determined by means of an electric field meter with a potential measuring probe, as a function of position and voltage.

## What you need:

Electric field meter	11500.10	1
Potential probe	11501.00	1
Capacitor plate with hole, $d = 55$ mm	11500.01	1
High voltage supply 0...10 kV	13670.93	1
Conducting ball, $d = 20$ mm	06236.00	1
Conducting ball, $d = 40$ mm	06237.00	1
Conducting ball, $d = 120$ mm	06238.00	1
High value resistors, $10\text{ M}\Omega$	07160.00	1
Insulating stem	06021.00	2
Power supply 0-12 V DC/ 6 V, 12 V AC	13505.93	1
Multi range meter, analogue	07028.01	1
Barrel base -PASS-	02006.55	3
Stand tube	02060.00	1
Tripod base -PASS-	02002.55	1
Meter Scale, $l = 1000 \times 27$ mm	03001.00	1
Rubber tubing, $d_1 = 6$ mm, $l = 1$ m	39282.00	1
Butane burner Labogaz 206	32178.00	1
Butane cartridge C 206 without valve	47535.00	2
Connecting cable, 30 kV, $l = 500$ mm	07366.00	1
Connecting cable, 4 mm plug, 32 A, red, $l = 75$ cm	07362.01	3
Connecting cable, 4 mm plug, 32 A, blue, $l = 75$ cm	07362.04	2
Connecting cable, 4 mm plug, 32 A, green-yellow, $l = 75$ cm	07362.15	2
Connecting cable, 4 mm plug, 32 A, green-yellow, $l = 25$ cm	07360.15	2

Complete Equipment Set, Manual on CD-ROM included  
Coulomb potential and Coulomb field  
of metal spheres P2420500



Field strength as a function of voltage.

Graphs 1-3: sphere with  $2R = 12$  cm;  
 $r_1 = 25$  cm,  $r_2 = 50$  cm,  $r_3 = 75$  cm;  
graph 4: sphere with  $2R = 4$  cm;  
 $r_1 = 25$  cm.

## Tasks:

1. For a conducting sphere of diameter  $2R = 12$  cm, electrostatic potential is determined as a function of voltage at a constant distance from the surface of the sphere.
2. For the conducting spheres of diameters  $2R = 12$  cm and  $2R = 4$  cm, electrostatic potential at constant voltage is determined as a function of the distance from the surface of the sphere.
3. For both conducting spheres, electric field strength is determined as a function of charging voltage at three different distances from the surface of the sphere.
4. For the conducting sphere of diameter  $2R = 12$  cm, electric field strength is determined as a function of the distance from the surface of the sphere at constant charging voltage.