

**Electrical safety:** Norm IEC/EN 61010-1, 150 V Cat. II - Pol. 2

**Protection index:** IP40 following EN 60529

**Environmental specification:**

- Climatic category: normal (N)
- Operating temperature: -10°C to +55°C
- Storage temperature: -40°C to +70°C
- Relative humidity: 20 to 96 % RH, non-condensing

## ■ Resistance boxes

### ● Individual resistance boxes

| Box                  | Model        |
|----------------------|--------------|
| $\Omega \times 0,1$  | P03.1975.21A |
| $\Omega \times 1$    | P03.1975.22A |
| $\Omega \times 10$   | P03.1975.23A |
| $\Omega \times 100$  | P03.1975.24A |
| $\Omega \times 1000$ | P03.1975.25A |
| $k\Omega \times 10$  | P03.1975.26A |
| $k\Omega \times 100$ | P03.1975.27A |
| $M\Omega \times 1$   | P03.1975.28A |

### ● 4, 5, 6, and 7-decade resistance boxes

| Box  | Model       |
|------|-------------|
| BR04 | P01.1974.01 |
| BR05 | P01.1974.02 |
| BR06 | P01.1974.03 |
| BR07 | P01.1974.04 |

## ■ Switch with 7 ratios

| Model | P03.1975.31A |
|-------|--------------|
|-------|--------------|

## ■ Capacitance boxes

### ● Individual capacitance boxes

| Box                    | Model        |
|------------------------|--------------|
| $1 \mu F \times 10$    | P03.1996.11A |
| $0.1 \mu F \times 10$  | P03.1996.12A |
| $0.01 \mu F \times 10$ | P03.1996.13A |

### ● 5-decade capacitance box

| Box  | Model       |
|------|-------------|
| BC05 | P01.1974.21 |

## ■ Inductance boxes

### ● 7-decade inductance box

| Box  | Model       |
|------|-------------|
| BL07 | P01.1974.51 |

## ■ Zero galvanometer

| Model | P03.1976.11A |
|-------|--------------|
|-------|--------------|

## ■ Dual switch box

| Model | P03.1975.29A |
|-------|--------------|
|-------|--------------|

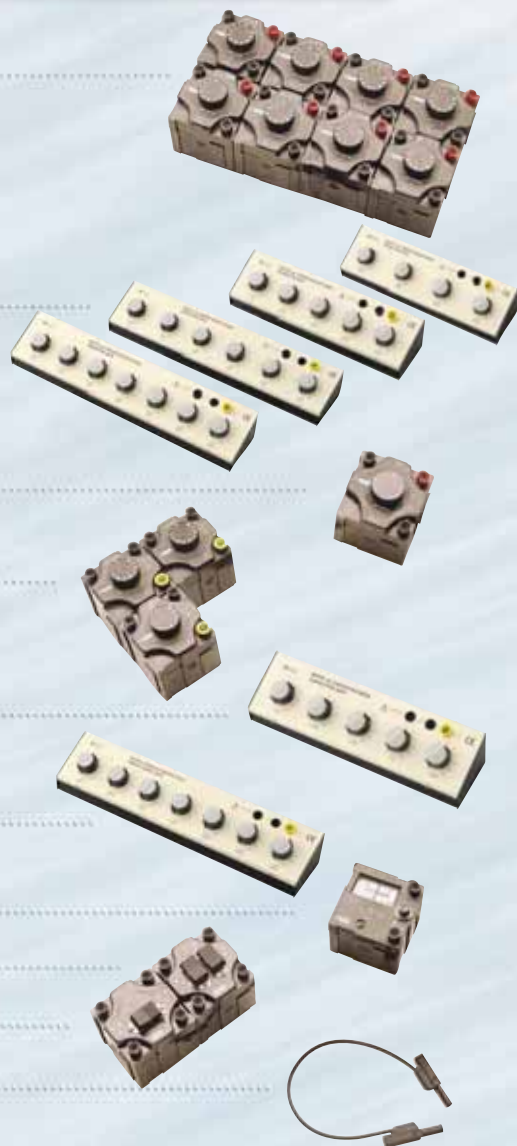
## ■ Simple inverter box

| Model | P03.1975.30A |
|-------|--------------|
|-------|--------------|

## ■ Safety lead IEC/EN 61010-2-031

| Model                                    | P01.2950.56 |
|--|-------------|
| Length 25 cm with 2 safety plugs         |             |
| $\varnothing$ 4 mm with rear connection. |             |

NB: each box is supplied with a lead IEC/EN 61010-2-031

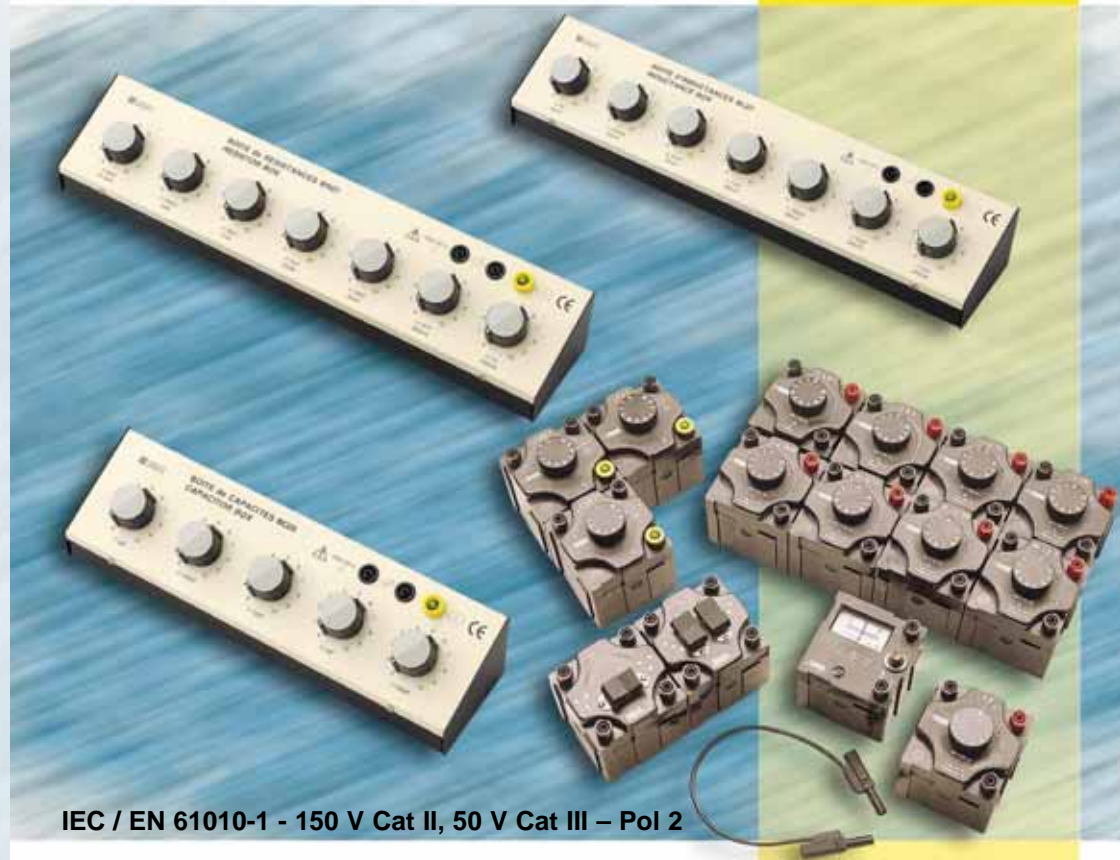


906 211 059 - Ed1 - 02/02 - Characteristics subject to modifications according to technological developments.

# Resistance, capacitance and inductance,...

for educational and general purpose use

# Decade boxes



IEC / EN 61010-1 - 150 V Cat II, 50 V Cat III – Pol 2

**Modular boxes for simulation or substitution in general industrial laboratory, R&D, maintenance, and educational use**

- Selection by rotary switch with guilt contacts (stators giving a clear indication of the dial setting)
- Stop position to prevent accidental switching from 10 to 1
- Male earth terminal with safety blank
- Outputs on  $\varnothing$  4 mm safety terminals
- Link leads IEC/EN 61010-2-031

## Resistance boxes

### Individual resistance boxes

8 individual boxes with 11-position switch (0 = short circuit)  
3 safety terminals Ø 4 mm per box

| Box                   | Range                  | I max. | Accuracy               | Model        |
|-----------------------|------------------------|--------|------------------------|--------------|
| $\Omega \times 0.1$   | 0.1 to 1 $\Omega$      | 1 A    | 1 % $\pm$ 5 m $\Omega$ | P03.1975.21A |
| $\Omega \times 1$     | 1 to 10 $\Omega$       | 750 mA | 1 % $\pm$ 5 m $\Omega$ | P03.1975.22A |
| $\Omega \times 10$    | 10 to 100 $\Omega$     | 250 mA | 0.5 %                  | P03.1975.23A |
| $\Omega \times 100$   | 100 to 1000 $\Omega$   | 75 mA  | 0.5 %                  | P03.1975.24A |
| $\Omega \times 1000$  | 1 to 10 k $\Omega$     | 25 mA  | 0.5 %                  | P03.1975.25A |
| k $\Omega \times 10$  | 10 to 100 k $\Omega$   | 7.5 mA | 0.5 %                  | P03.1975.26A |
| k $\Omega \times 100$ | 100 to 1000 k $\Omega$ | 2 mA   | 0.5 %                  | P03.1975.27A |
| M $\Omega \times 1$   | 1 to 10 M $\Omega$     | 0.2 mA | 0.5 %                  | P03.1975.28A |

- Temperature coefficient:  
 $\pm 50$  ppm for the ranges  $> 1 \Omega$ ,  $\pm 100$  ppm for the 1  $\Omega$  range and  $\pm 25$  ppm for the 0.1  $\Omega$  range

- Residual resistor:  
15 m $\Omega \pm$  5 m $\Omega$  suppressed from the first value  
- Dimensions: 72 x 72 x 90 mm - Weight: 220 g

### 4, 5, 6 and 7-decade resistance boxes

Resistance in desk-type box  
Connection: safety terminals Ø 4 mm

Front panel and metallic box connected to a safety earth socket with failsafe system

**BR04** Model: P01.1974.01

| Decade | Range                         | I max. |
|--------|-------------------------------|--------|
| 1      | 1 $\Omega$ to 10 $\Omega$     | 700 mA |
| 2      | 10 $\Omega$ to 100 $\Omega$   | 200 mA |
| 3      | 100 $\Omega$ to 1 k $\Omega$  | 70 mA  |
| 4      | 1 k $\Omega$ to 10 k $\Omega$ | 20 mA  |

- Resistance range: 11.11 k $\Omega$   
- Accuracy: 1 %  
- Dimensions: 310 x 90 x 80 mm - Weight: 1 kg

**BR05** Model: P01.1974.02

| Decade | Range                           | I max. |
|--------|---------------------------------|--------|
| 1      | 1 $\Omega$ to 10 $\Omega$       | 700 mA |
| 2      | 10 $\Omega$ to 100 $\Omega$     | 200 mA |
| 3      | 100 $\Omega$ to 1 k $\Omega$    | 70 mA  |
| 4      | 1 k $\Omega$ to 10 k $\Omega$   | 20 mA  |
| 5      | 10 k $\Omega$ to 100 k $\Omega$ | 7 mA   |

- Resistance range: 111.11 k $\Omega$   
- Accuracy: 1 %  
- Dimensions: 310 x 90 x 80 mm - Weight: 1 kg

**BR06** Model: P01.1974.03

| Decade | Range                           | I max. |
|--------|---------------------------------|--------|
| 1      | 1 $\Omega$ to 10 $\Omega$       | 700 mA |
| 2      | 10 $\Omega$ to 100 $\Omega$     | 200 mA |
| 3      | 100 $\Omega$ to 1 k $\Omega$    | 70 mA  |
| 4      | 1 k $\Omega$ to 10 k $\Omega$   | 20 mA  |
| 5      | 10 k $\Omega$ to 100 k $\Omega$ | 7 mA   |
| 6      | 100 k $\Omega$ to 1 M $\Omega$  | 1 mA   |

- Resistance range: 1.11111 k $\Omega$   
- Accuracy: 1 %  
- Dimensions: 410 x 90 x 80 mm - Weight: 1.4 kg

**BR07** Model: P01.1974.04

| Decade | Range                           | I max. |
|--------|---------------------------------|--------|
| 1      | 1 $\Omega$ to 10 $\Omega$       | 700 mA |
| 2      | 10 $\Omega$ to 100 $\Omega$     | 200 mA |
| 3      | 100 $\Omega$ to 1 k $\Omega$    | 70 mA  |
| 4      | 1 k $\Omega$ to 10 k $\Omega$   | 20 mA  |
| 5      | 10 k $\Omega$ to 100 k $\Omega$ | 7 mA   |
| 6      | 100 k $\Omega$ to 1 M $\Omega$  | 1 mA   |
| 7      | 1 M $\Omega$ to 10 M $\Omega$   | 0.1 mA |

- Resistance range: 11.11111 k $\Omega$   
- Accuracy: 1 %  
- Dimensions: 410 x 90 x 80 mm - Weight: 1.4 kg

## Inductance Box

### 7-decade inductance box

Inductance custom wound ferrite core, ensure a high 'Q' factor, typical 55 to 100.  
The voltage applied depends largely on the frequency of use. The voltage must be limited

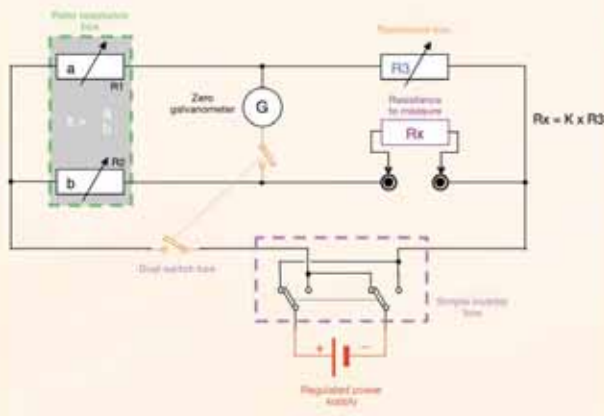
| Decade | Max. range                | I DC Q | Meas. factor | Max. frequency | Resistance    | Accuracy |
|--------|---------------------------|--------|--------------|----------------|---------------|----------|
| 1      | 1 $\mu$ H to 10 $\mu$ H   | 300 mA | 120          | 1.2 MHz        | 2 $\Omega$    | 5%       |
| 2      | 10 $\mu$ H to 100 $\mu$ H | 200 mA | 140          | 500 kHz        | 5 $\Omega$    | 5%       |
| 3      | 100 $\mu$ H to 1 mH       | 100 mA | 80           | 150 kHz        | 13 $\Omega$   | 5%       |
| 4      | 1 mH to 10 mH             | 100 mA | 150          | 50 kHz         | 34 $\Omega$   | 5%       |
| 5      | 10 mH to 100 mH           | 70 mA  | 65           | 10 kHz         | 55 $\Omega$   | 5%       |
| 6      | 100 mH to 1 H             | 50 mA  | 100          | 10 kHz         | 220 $\Omega$  | 5%       |
| 7      | 1 H to 10 H               | 40 mA  | 50           | 10 kHz         | 1500 $\Omega$ | 10%      |

- Dimensions: 410 x 90 x 80 mm - Weight: 1.4 kg

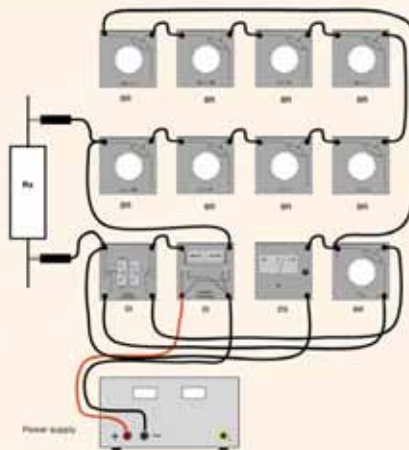
**BL07** Model: P01.1974.51

to prevent saturation of the core and overheating.  
Connection: safety terminals Ø 4 mm  
Front panel and metallic box connected to a safety earth socket with failsafe system.

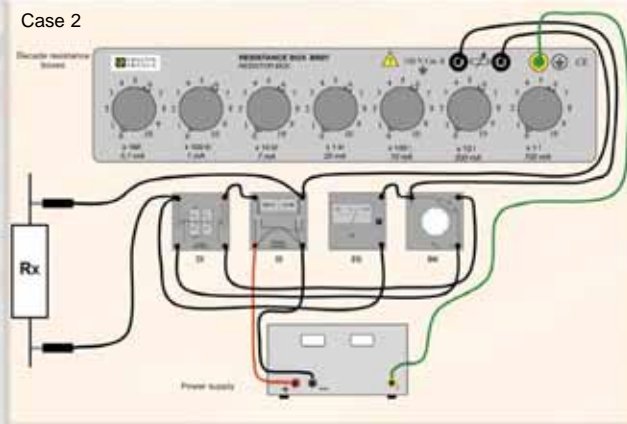
## Wheatstone Bridge: theoretical diagram



Case 1



Case 2



BR Resistance box  
DI Dual switch box  
SI Simple inverter box  
ZG Zero galvanometer  
BK Ratio resistance box

## K ratio resistance box

### Switch with 7 ratios

- K = 1/1000 - 1/100 - 1/10 - 1 - 10 - 100 - 1000  
- Accuracy:  $\pm 0.2$  %  
- Temperature coefficient:  $\pm 10$  ppm

Model: P03.1975.31A

- 3 safety terminals Ø 4 mm  
- Dimensions: 72 x 72 x 90 mm - Weight: 220 g

| I max. | 25 mA | 75 mA | 250 mA | 750 mA |
|--------|-------|-------|--------|--------|
| K      | 1     | 10    | 100    | 1000   |

## Capacitance boxes

### Individual capacitance boxes

3 individual boxes with 11-position switch (including 0)  
2 safety terminals Ø 4 mm and 1 earth terminal

| Box               | Range             | Loss angle | Accuracy     |
|-------------------|-------------------|------------|--------------|
| 1 $\mu$ F x 10    | 1 to 10 $\mu$ F   | $< 10^2$   | P03.1996.11A |
| 0,1 $\mu$ F x 10  | 0,1 to 1 $\mu$ F  | $< 10^2$   | P03.1996.12A |
| 0,01 $\mu$ F x 10 | 0,01 to 1 $\mu$ F | $< 10^2$   | P03.1996.13A |

- Dimensions: 72 x 72 x 90 mm  
- Weight: 220 g

- Accuracy: 2 %

### 5-decade capacitance box

Capacitor polystyrene and polypropylene, high accuracy temperature coefficient 125 ppm/ $^{\circ}$ C and high insulated  
Connection: safety terminals Ø 4 mm  
Front panel and metallic box connected to a safety earth socket with failsafe system.

**BC05**

Model: P01.1974.21

| Decade | Range                   |
|--------|-------------------------|
| 1      | 0.1 nF to 1 nF          |
| 2      | 1 nF to 10 nF           |
| 3      | 10 nF to 100 nF         |
| 4      | 100 nF to 1 $\mu$ F     |
| 5      | 1 $\mu$ F to 10 $\mu$ F |

- Capacitance range: 11.111  $\mu$ F  
- Residual capacitance: typical 20 pF  
- Accuracy:  $\pm 1$  % (low residual capacitance)  
- Max. operating voltage: 300 V DC, 230 V AC (50 Hz)  
- Dimensions: 310 x 90 x 80 mm - Weight: 1 kg

## Zero galvanometer

Model: P03.1976.11A

- Equipment with taut ribbon suspension  
- Dial with anti-parallax mirror  
• Scale length: 20 mm  
• 10 divisions both sides of zero  
- 2 ranges with press button:  
• Rest (x1):  $\pm 1$  mA i.e 100  $\mu$ A/div  
• Work (x100):  $\pm 10$   $\mu$ A i.e 1  $\mu$ A/div

- 2 safety terminals Ø 4 mm  
• I max.: 1 mA  
• Internal resistance: 180  $\Omega$  (dual range)  
• Accuracy:  $\pm 2.5$ % of the scale range  
• Dimensions: 72 x 72 x 63 mm - Weight: 220 g

## Dual switch box

Model: P03.1975.29A

- 2 switches with 3 positions: open - closed - fugitive (button)

- 4 safety terminals Ø 4 mm  
• P max.: 50 VA - I max.: 5 A - U max.: 250 V  
• Dimensions: 72 x 72 x 63 mm - Weight: 220 g

## Simple inverter box

Model: P03.1975.30A

- 1 bipolar inverter with 3 positions: open - closed - inverted

- 4 safety terminals Ø 4 mm  
• P max.: 50 VA - I max.: 5 A - U max.: 250 V  
• Dimensions: 72 x 72 x 63 mm - Weight: 220 g