

## Resistance, capacitance and inductance, ... for educational and general purpose use



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 Ø 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 $\Omega$	P03197521A
$\Omega \times 1$	1 to 10 $\Omega$	750 mA	1 % $\pm$ 5 m $\Omega$	P03197522A
$\Omega \times 10$	10 to 100 $\Omega$	250 mA	0.5 %	P03197523A
$\Omega \times 100$	100 to 1000 $\Omega$	75 mA	0.5 %	P03197524A
$\Omega \times 1000$	1 to 10 k $\Omega$	25 mA	0.5 %	P03197525A
k $\Omega \times 10$	10 to 100 k $\Omega$	7.5 mA	0.5 %	P03197526A
k $\Omega \times 100$	100 to 1000 k $\Omega$	2 mA	0.5 %	P03197527A
M $\Omega \times 1$	1 to 10 M $\Omega$	0.2 mA	0.5 %	P03197528A

- 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: P01197401

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: P01197402

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: P01197403

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: P01197404

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

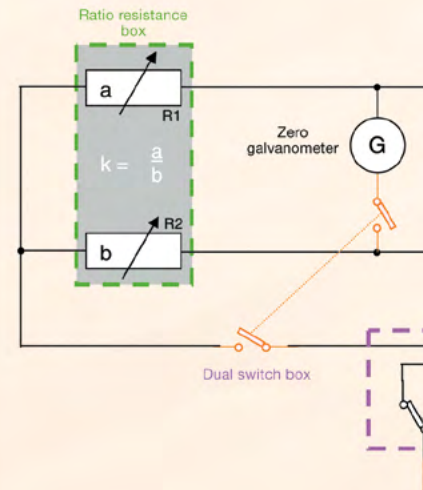
**BL07** Model: P01197451

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.

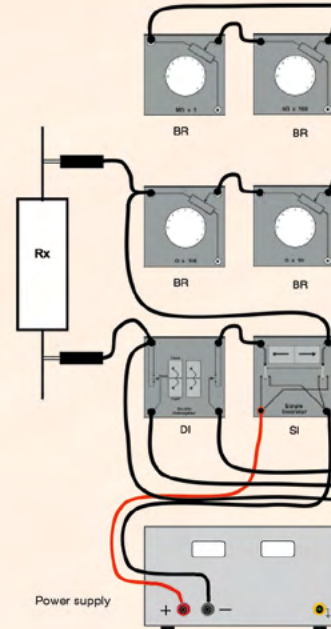
Decade	Range	I DC max.	Q factor	Meas. frequency	Max. Resistance	Accuracy
1	1 $\mu$ H to 10 $\mu$ H	300 mA	120	1.2 MHz	2 $\Omega$	$\pm$ 3 %
2	10 $\mu$ H to 100 $\mu$ H	200 mA	140	500 kHz	5 $\Omega$	$\pm$ 3 %
3	100 $\mu$ H to 1 mH	100 mA	80	150 kHz	13 $\Omega$	$\pm$ 3 %
4	1 mH to 10 mH	100 mA	150	50 kHz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

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

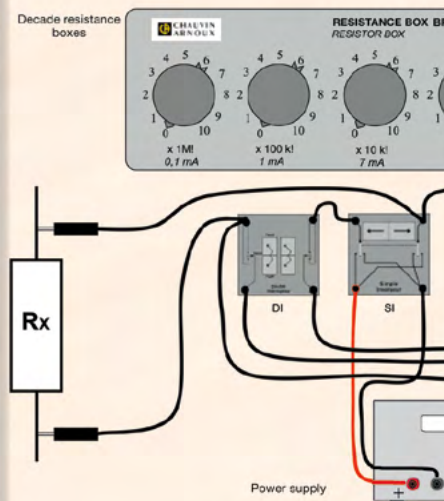
## Wheatstone bridge: the



## Case 1

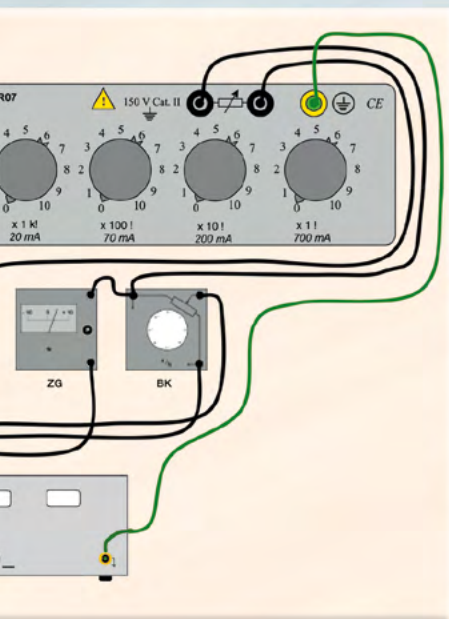
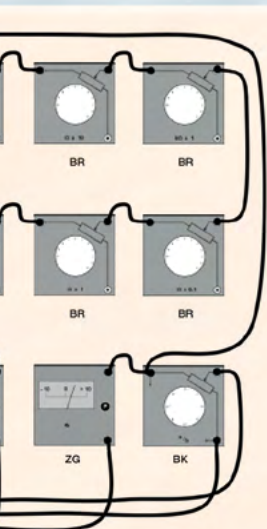
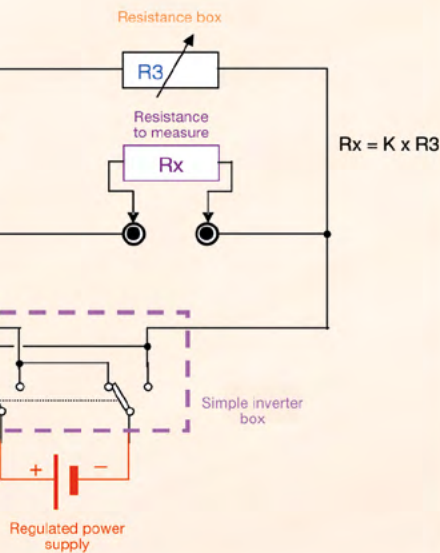


## Case 2



BR Resistance box  
DI Dual switch box  
SI Simple inverter box

## Theoretical diagram



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: P03197531A

- 3 safety terminals  $\varnothing 4$  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  $\varnothing 4$  mm and 1 earth terminal

Box	Range	Loss angle	Model
1 $\mu\text{F} \times 10$	1 to 10 $\mu\text{F}$	$< 10^{-2}$	P03199611A
0.1 $\mu\text{F} \times 10$	0,1 to 1 $\mu\text{F}$	$< 10^{-2}$	P03199612A
0.01 $\mu\text{F} \times 10$	0,01 to 1 $\mu\text{F}$	$< 10^{-2}$	P03199613A

- Dimensions: 72 x 72 x 90 mm
- Accuracy: 2 %
- Weight: 220 g

### 5-decade capacitance box

Capacitor polystyrene and polypropylene, high accuracy temperature coefficient 125 ppm/ $^{\circ}\text{C}$  and high insulated

Connection: safety terminals  $\varnothing 4$  mm

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

### BC05

Model: P01197421

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 $\mu\text{F}$
5	1 $\mu\text{F}$ to 10 $\mu\text{F}$

- Capacitance range: 11.111  $\mu\text{F}$
- 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: P03197611A

- 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 (x 1):  $\pm 1$  mA i.e 100  $\mu\text{A}/\text{div}$
  - Work (x 100):  $\pm 10$   $\mu\text{A}$  i.e 1  $\mu\text{A}/\text{div}$

- 2 safety terminals  $\varnothing 4$  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: P03197529A

- 2 switches with 3 positions: open - closed - fugitive (button)
- 4 safety terminals  $\varnothing 4$  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: P03197530A

- 1 bipolar inverter with 3 positions: open - closed - inverted
- 4 safety terminals  $\varnothing 4$  mm
  - P max.: 50 VA - I max.: 5 A - U max.: 250 V
  - Dimensions: 72 x 72 x 63 mm – Weight: 220 g

**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
$\Omega \times 0,1$	P03197521A
$\Omega \times 1$	P03197522A
$\Omega \times 10$	P03197523A
$\Omega \times 100$	P03197524A
$\Omega \times 1000$	P03197525A
$k\Omega \times 10$	P03197526A
$k\Omega \times 100$	P03197527A
$M\Omega \times 1$	P03197528A

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

Box	Model
BR04	P01197401
BR05	P01197402
BR06	P01197403
BR07	P01197404

## ■ Switch with 7 ratios

Model	
P03197531A	

## ■ Capacitance boxes

### ● Individual capacitance boxes

Box	Model
$1 \mu F \times 10$	P03199611A
$0.1 \mu F \times 10$	P03199612A
$0.01 \mu F \times 10$	P03199613A

### ● 5-decade capacitance box\*

Box	Model
BC05	P01197421

## ■ Inductance boxes

### ● 7-decade inductance box\*

Box	Model
BL07	P01197451

## ■ Zero galvanometer

Model	
P03197611A	

## ■ Dual switch box

Model	
P03197529A	

## ■ Simple inverter box

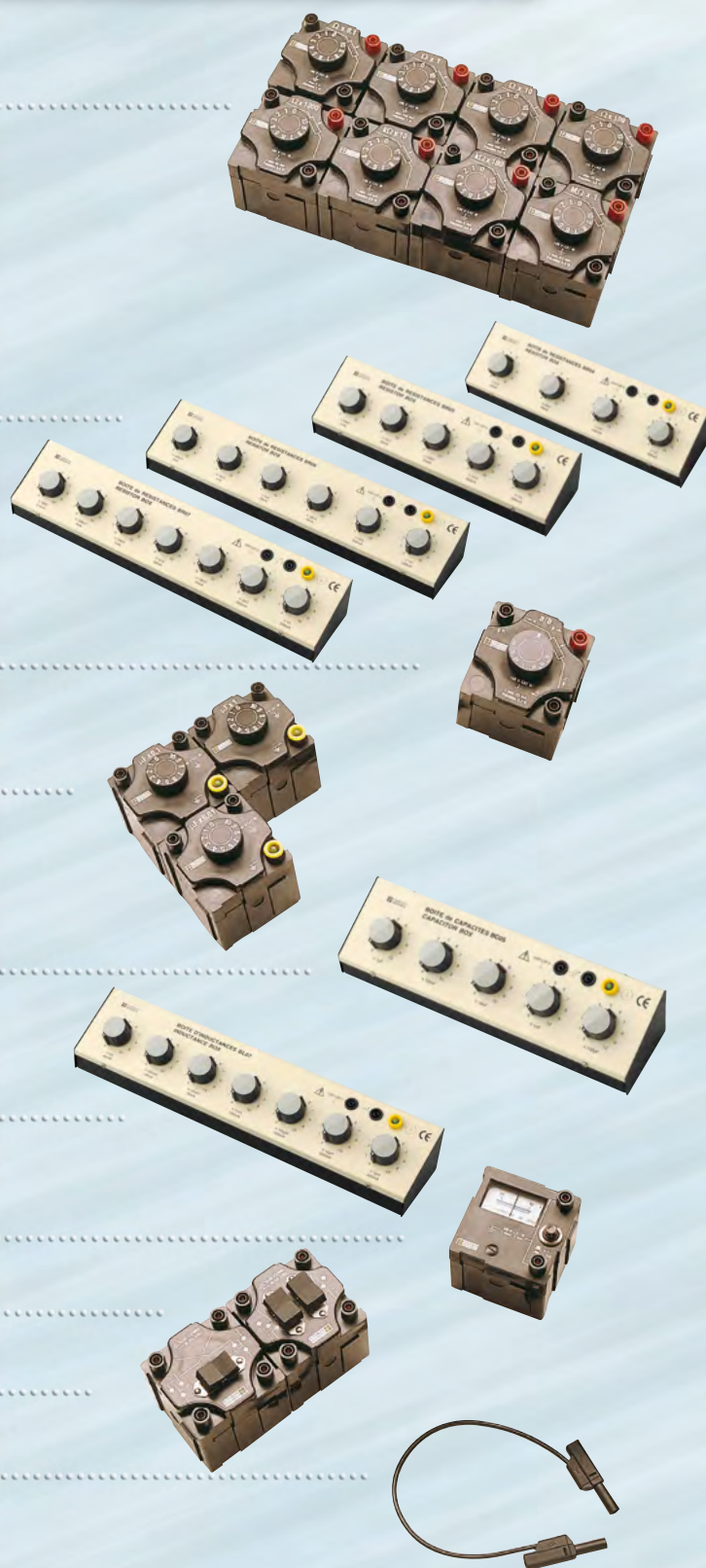
Model	
P03197530A	

## ■ Safety lead IEC/EN 61010-2-031

Model	
P01295056	

Length 25 cm with 2 safety plugs  
Ø 4 mm with rear connection.

NB: each box is supplied with a lead IEC/EN 61010-2-031 (except\*).



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