

# Decade Capacitor MA 2405 Instruction manual

Version 1.1, Code no. 20 750 123

*Distributor:*

*Manufacturer:*

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Mark on your equipment certifies that this equipment meets the requirements of the EU (European Union) concerning safety and electromagnetic compatibility regulations

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## 1 General

MA 2405 Decade Capacitor is intended for all application areas where variable capacitance selected by hand is required. It is passive electric device housed in metallic case and with internal guarding. It consists of 3 decades for selection of the capacitance.

MA 2405 Decade Capacitor uses high quality polypropylene capacitors providing accuracy of 5 %.

Very good DC insulation resistance of the capacitors enables the application also in DC circuits, insulation materials also provide low dissipation factor at the frequencies normally used.

Maximum voltage rating meets usual requirements. The guard is connected to one part of the decade and is insulated from the enclosure.

The MA 2405 is equipped with a rubber legs for safe standing on smooth surfaces.  
Applied standard - safety: EN 61010-1

### 1.1 Warnings

- ❑ **If the Decade Capacitor is used in a manner not specified in this Users Manual, the protection provided by the equipment may be impaired!**
- ❑ **Do not use the Decade Capacitor if any damage is noticed!**
- ❑ **If the voltage of circuit connected to the Decade Capacitor is higher than safety level then its metallic enclosure must be connected to PE (ground) terminal of circuit to prevent electric shock!**
- ❑ **Do not exceed ratings marked on front plate!**
- ❑ **MA 2405 does not contain any user replaceable components!**

## 2 Technical Data

Capacitance range:  
100 pF to 100.000 pF

Decade ranges:  
x 100 pF ..... 100 pF to 1000 pF  
x 1000 pF ..... 1000 pF to 9000 pF  
x 10.000 pF ..... 10.000 pF to 90.000 pF

Accuracy: ..... ± 5 %  
Temperature coefficient: -50 ÷ -350 ppm/K

Capacitance  
Case to the guard ..... 100 pF ±10 %

Useful frequencies:  
x 100 pF range ..... 9 MHz  
x 1000 pF range ..... 2 MHz  
x 10.000 pF range ..... 500 kHz

Dissipation factor (tgδ):

Capacitance [pF]	10 kHz	100 kHz	11 MHz
$C \leq 1000$	$\leq 5 \times 10^{-4}$	-	$\leq 10 \times 10^{-4}$
$1000 < C \leq 5000$	$\leq 5 \times 10^{-4}$	$\leq 10 \times 10^{-4}$	-
$5000 < C \leq 20000$	$\leq 5 \times 10^{-4}$	$\leq 15 \times 10^{-4}$	-
$20000 < C \leq 47000$	$\leq 5 \times 10^{-4}$	$\leq 25 \times 10^{-4}$	-
$C > 47000$	$\leq 5 \times 10^{-4}$	$\leq 40 \times 10^{-4}$	-

Maximum working voltage  
between any two sockets:  
versus frequency:

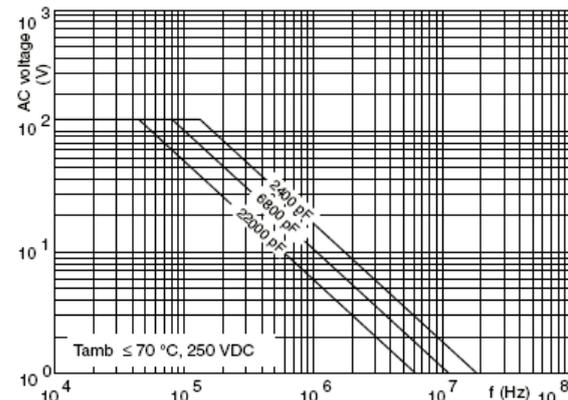
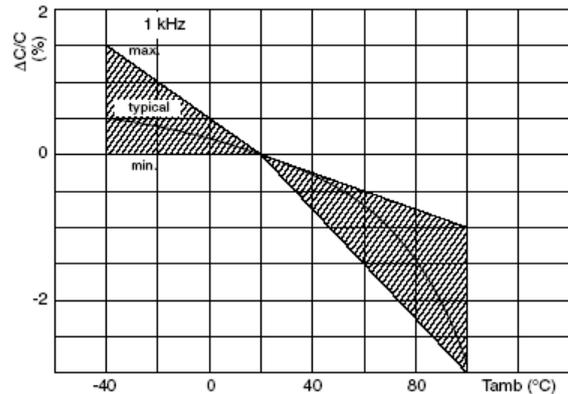
DC ..... 250 V  
AC r.m.s. .... 175 V / 50 Hz

Overvoltage category  
enclosure connected to PE: ... 150 V CAT II  
enclosure floating: ..... 100 V CAT II  
Pollution degree ..... 2

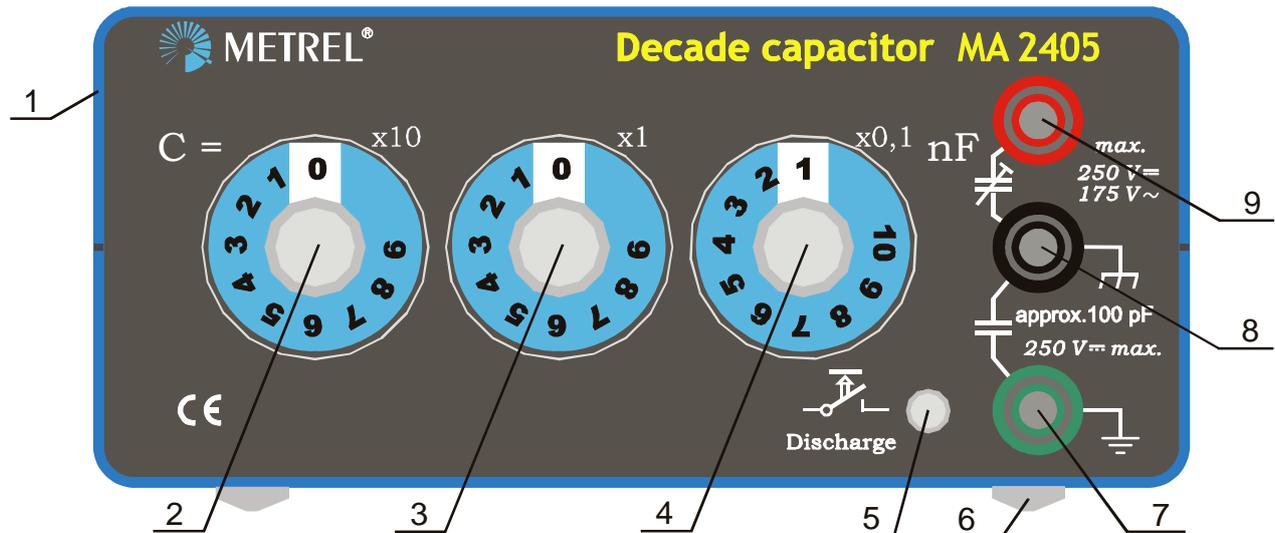
Insulation resistance: ..... min. 10.000 MΩ  
Discharging: ..... yes  
Discharge resistance ..... 100 kΩ / 1W

Dimensions (W x H x D) ..... 190 mm x 90 mm x 170 mm  
Weight ..... 1.35 kg

Working temperature range ..... -10 °C ÷ 55 °C  
Maximum relative humidity ..... 90 %RH (0 °C ÷ 55 °C), non-condensing  
Storage temperature range ..... -15 °C ÷ 70 °C



### 3 Capacitor decade description



Legend:

1	Case	Metallic enclosure of capacitor decade.
2	Dial x 10	Rotary switch for selection of capacitance in range 10 nF to 90 nF.
3	Dial x 1	Rotary switch for selection of capacitance in range 1 nF to 9 nF.
4	Dial x 0.1	Rotary switch for selection of capacitance in range 100 pF to 1 nF.
5	Discharge button	Discharges selected capacitance through 100 kΩ resistor.
6	Rubber legs	Prevent sliding on smooth surface.
7	Green socket	<b>Should be connected to protect earth (PE) to prevent electric shock when working with hazardous voltages.</b>
8	Black socket	One pole of capacitor. Guard contact.
9	Red socket	Second pole of capacitor.

#### Application

- ❑ Connect red and black sockets to the circuit being observed.
- ❑ Connect green socket to well grounded PE.
- ❑ Select and modify capacitance according to required observing.
- ❑ Discharge the MA 2405 after finished observing.

#### Notes:

- ❑ Guard act as internal shielding of capacitor circuit of MA 2405.
- ❑ It is recommended to connect guard terminal (black) to ground of observed circuit or to a low impedance node, e.g. output of operational amplifier and red terminal to sensitive point of circuit. This prevents parasitic effects of stray capacitances to observed circuit.
- ❑ Pressing the discharge key during working with observed circuit will connect 100 kΩ resistor in parallel to selected capacitance of the MA 2405. It withstands maximum rated voltages that are defined in technical data.

## **4 Maintenance**

### **Inspection**

To maintain operator safety and ensure reliability of MA 2405 it is good practice to inspect it on a regular basis. Check that the enclosure is without defects that could lead to safety problems. If any defect is found, please consult repair centre, distributor and/or manufacturer.

### **Cleaning**

Use a soft cloth slightly moistened with soapy water or spirit to clean the surface of the instrument and leave the instrument to dry totally before using it.

### **Notes!**

- **Do not use liquids based on petrol or hydrocarbons!**
- **Do not spill cleaning liquid over the instrument!**

### **Calibration**

It is essential, that MA 2405 is regularly calibrated. We recommend an annual calibration.

### **Service**

Repairs under or out of warranty time: Please contact your distributor for further information.

