



EQUIPMENT FOR LABORATORIES AND SCHOOLS



Power Supply Unit
Decade Capacitance
Decade Inductance
Decade Resistance



Power Supply Unit

The MA 4804, MA 4852 and MA 4853 are power supply units with the built-in variable transformers permitting a continuous voltage adjustment within the limits of declared specifications. The transformers have separate primary and secondary windings resulting in galvanic isolation of the mains circuit from output circuit. This is frequent requirement for energizing specific electrical devices.

The power supply units are equipped with V-meter and A-meter, which allow a permanent control over output voltage and current. They are overload-protected with a circuit-breaker which disconnects the secondary circuits when a short-circuit condition occurs at the output.

Field Application

The MA 4804, MA 4852 and MA 4853 power supply units are used in electronic industry (electrical and control labs), in service workshops, in technical education, etc., briefly everywhere adjustable supply voltage is needed, or where for technical or safety reasons the power supply source has to be galvanically insulated from the mains. Test voltage of 4kV a.c. rms between input and output enables using the units in CAT III 300 V environment.

Characteristics

MA 4804 is a source of adjustable a.c. voltage from 0 to 245 V, with permissible permanent load of 3.1 A. The unit contains special circuit to prevent high inrush current.

MA 4852 is a low-voltage source of a.c. and d.c. voltage. The d.c. voltage can be adjusted in the range of 0 to 46 V and a.c. voltage from 0 to 33 V. The permissible total current load is 6 A. The power supply unit has a built-in C filter for filtering out d.c. voltage.

MA 4853 is a power supply unit with improved characteristic of MA 4852. A CLC filter is incorporated for d.c. output voltage smoothing.

MA 4804



MA 4852



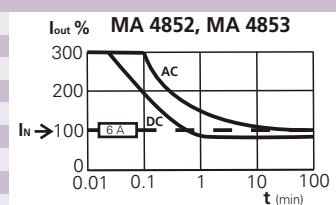
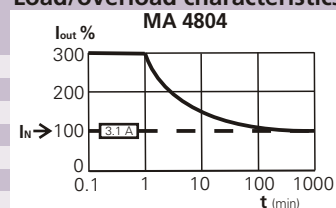
MA 4853



Technical specifications

Part No.	MA 4804	MA 4852	MA 4853
Power supply:	230 V, 50-60 Hz	230 V, 50-60 Hz	230 V, 50-60 Hz
Output voltage:			
a.c. voltage	0 ÷ 245 V (230 V)*	0 ÷ 33 V (30 V)*	0 ÷ 33 V (30 V)*
d.c. voltage	-	0 ÷ 46 V (32 V)*	0 ÷ 46 V (32 V)*
Permissible permanent currents:	3.1 A	6 A (d.c. + a.c.ef)	6 A (d.c. + a.c.ef)
Ripple of the d.c. output:		<15 V _{pp} (I=6 A) <3.5 V _{pp} (I=1 A)	<200 mV _{pp} (I=6 A) <30 mV _{pp} (I=1 A)
Operating temperature range:	-5 ÷ +40 °C	-5 ÷ +40 °C	-5 ÷ +40 °C
Dimensions (w x h x l):	228 x 216 x 210	228 x 216 x 210	228 x 216 x 210
Weight:	11 kg	8.2 kg	9.1 kg

Load/overload characteristics





Decade

MA 2405



MA 2405 Decade capacitor is intended for all application areas where capacitance variation/selection by hand is required. It is all passive electric device housed in metallic case and with internal guarding. It consists of 3 decades for selection of the capacitance in range of 100 pF up to 100 nF. Set value is directly visible on decade's dials. 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 of 500 kHz and up.

MA 2705



MA 2705 Decade inductance is intended for all application areas where inductance variation/selection by hand is required. It is passive electric device housed in metallic case. It consists of 3 decades for selection of the inductance in range of 0 mH up to 999 mH. Set value is directly visible on decade's dials. MA 2705 Decade inductance uses ferrite chokes providing accuracy of 5 % at 50% of rated current.

A 2115 and MA 2115 S



MA 2115 and **MA 2115 S** Decade resistors are intended for all application areas where resistances variation/selection by hand are required. It is passive electric device housed in metallic case. Each consist of 7 decades with each own rotary switch with range multiplier from 0 to 9, and ∞ . Safety 4 mm sockets are connected to each resistance chain that it could be individually accessible. It is also possible to split resistance chain into two or more independent insulated groups by selection of rotary switch position ∞ .

Measurement accessories



Test lead 1000 V CAT II

Wire: PVC 0.75 mm;

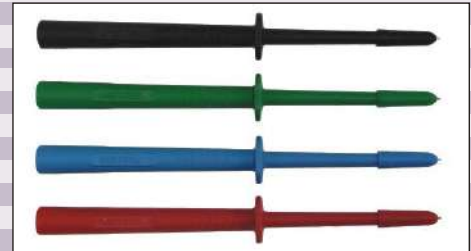
Imax.: 12 A

Voltage: 1000 V

Standards:

EN 61010-1: 2001

EN 61010-031: 2002/02



Test probes 1000 V CAT III

Max. current: 36 A

Contact resistance: <5 mW

Standard: EN 61010-031: 2002/02

Technical Specification

Decade capacitor	Part No. MA 2405
Capacitance:	100 pF to 100.000 pF in steps of 100 pF
Three 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:	$\pm 5\%$; $\pm 2\%$ on request
Dissipation factor (tg δ):	max. $5 \cdot 10^{-4}$ at 10 kHz
Limit frequencies:	
x 100 pF range	9 MHz
x 1000 pF range	2 MHz
x 10.000 pF range	500 kHz
Maximum voltage:	
DC	max. 250 V
AC	max. 175 V/50Hz
Guard capacitance working:	approx. 100 pF
Insulation resistance:	min 10.000 M Ω
Applicable overvoltage:	CAT II 150 V (case grounded)
Discharging:	via 100 k resistor with push-button "DISCHARGE"
Overvoltage category:	II
Dimensions (w x h x l):	190 x 90 x 170 mm
Weight:	1.35 kg

Decade inductance	Part No. MA 2705
Inductance range:	0 mH to 999 mH
- sub ranges:	
x 1 mH	0 mH to 9 mH
x 10 mH	0 mH to 90 mH
x 100 mH	0 mH to 900 mH
Accuracy within temperature range from 15 °C to 40 °C:	$\pm 5\%$ at IN/2
Increase of inductance at IN:	2 %
Capacitance between coils and housing:	<50 pF
Test voltage against housing:	1.5 kV
Current load (continuous):	max. 100 mA
Overvoltage category:	II
Dimensions (w x h x l):	190 x 90 x 175 mm
Weight:	1.15 kg

Decade resistor	Part No. MA 2115
Resistance range:	0 to 9 999 999 Ω
7 decades	9 x 1 Ω .. 9 x 1 M Ω
Optional on request:	
Decade resistor	Part No. MA 2115S
Modified decades:	9 x 0,1 Ω or up to 9 x 10 M Ω

Accuracy:	
- individual decade unit:	$\pm 1\% + 0.08 \Omega$
- 9 x 0.1 Ω option:	$\pm 2\% + 0.08 \Omega$
- overall:	$\pm 1\% + 0.4 \Omega$
Maximum ratings:	
- continuous power dissipation:	1 W / resistor
- voltage / current:	marked on front plate
- working voltage to case:	500 V d.c. / a.c. rms
- working voltage in position:	250 V d.c. / a.c. rms
Protection classification:	Class I
Over-voltage category:	CAT III 300 V
Pollution degree:	2
Working temperature range:	(0 to 40) °C
Storage temperature range:	-10 °C to 80 °C
Max. humidity:	85 % RH (0 to 40) °C
Dimensions (w x h x d):	(267 x 89 x 97) mm
Weight:	0,8 kg

METREL d.d. manufactures test and measuring equipment. A range of products is intended to use in schools and laboratories.

Description The METREL equipment for laboratories and schools contain special units where some simple electrical regulation, adjustment, calibration, and wiring is required. Standard METREL models are listed in this publication. Tradition, experience, continuous production and products control, improvements, testing, safety and customer requirements are fil rouge for dealing with test and measuring equipment at METREL for approximately of half a century.

Product groups METREL offers the following laboratory and school product groups:

- Power supply units,
- Decade resistors,
- Decade capacitors,
- Decade inductance,
- Optional third party products (DMM, clamp meters...),
- Accessory (test leads, alligators, Current clamps).

See ordering information for standard products. Metrel also supports customer with their optional requirements.

Regulations The three basic regulations are base for function and safety of METREL laboratory and school products: European Low voltage directive 2006/95/EC (72/23/EEC), International standard EN / IEC 61010-1, EN / IEC 61010-031, EN / IEC 61010-032. The regulations are valid for all METREL laboratory and school products.

Application METREL laboratory and school products are applied in various applications including: Test power supplies for equipment and circuit testing, adjustments, Calibrations, Demonstrations, Educations, ...

High reliability METREL laboratory and school products are practically maintenance free. Long-life operation is assured with rugged construction,

Note! Photographs in this catalogue may slightly differ from the instruments at the time of delivery.
Subject to technical change without notice.



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