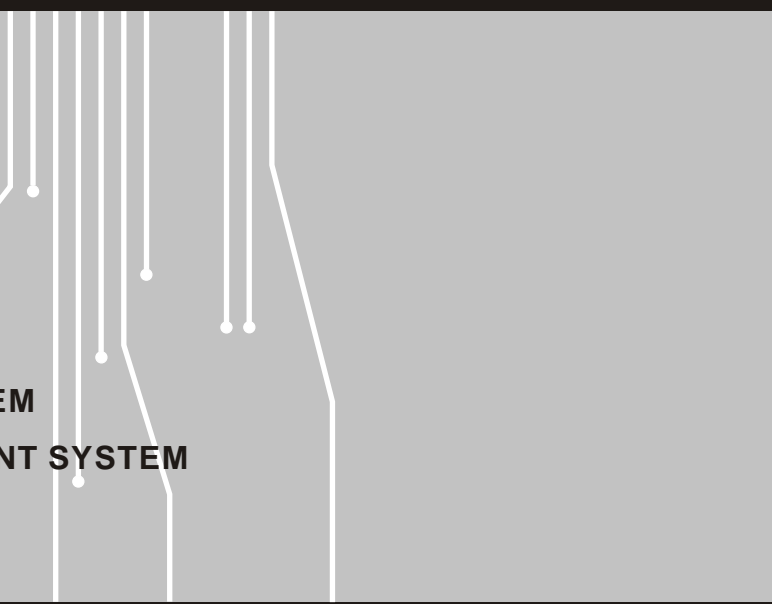


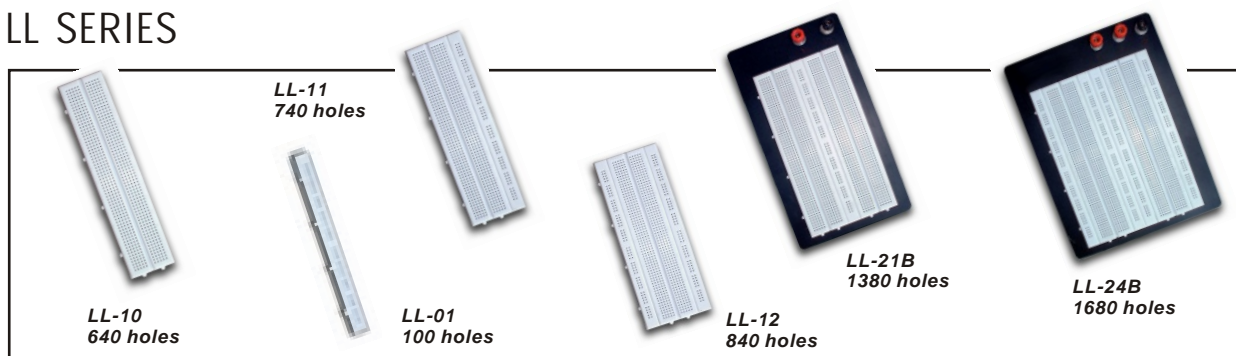
EDUCATION EQUOPMENTS

- ELECTRICAL TRAINING SYSTEM
- RHEOSTAT
- LAB DECADE BOX
- CIRCUIT LABORATORY
- ELECTRICAL TRAINING SYSTEM
- NEW ENERGY SIMULATION SYSTEM
- VIRTUAL ELECTRONIC TRAINING SYSTEM
- FREE ELECTRONS IN TUBES EXPERIMENT SYSTEM



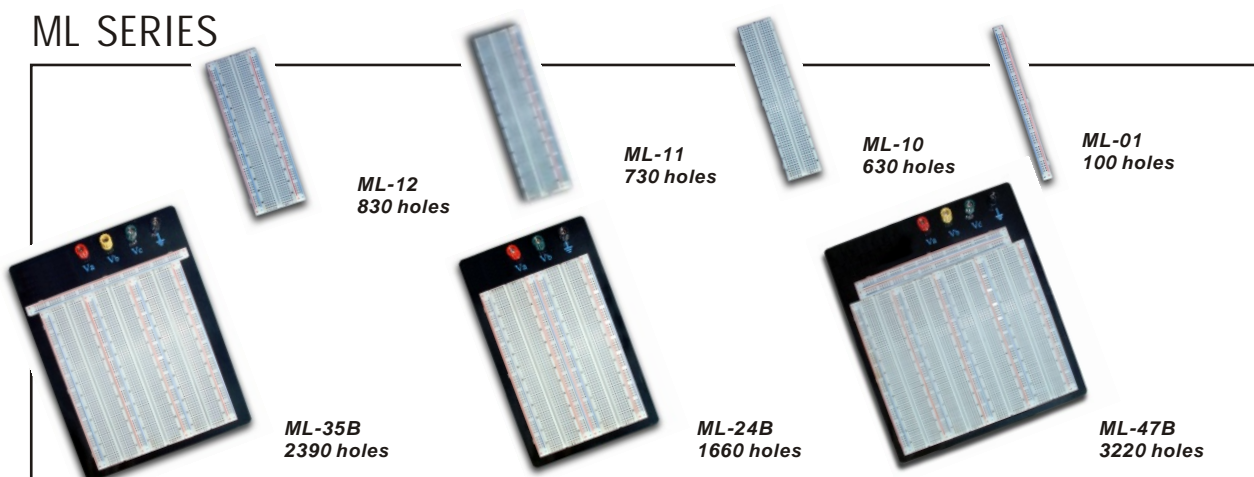
BREAD BOARD

LL SERIES



Model	Dimension(mm)			Holes	Terminal holes	Terminal strips	Distribution holes	Distribution strips	Binding post
	L	W	H						
LL-01	170	12	8	100	—	—	100	1	—
LL-10	170	38	8	640	640	1	—	—	—
LL-11	170	40	8	740	640	1	100	1	—
LL-12	170	62	8	840	640	1	200	2	—
LL-21B	220	120	9	1380	1280	2	100	1	2
LL-24B	220	165	9	1680	1280	2	400	4	3

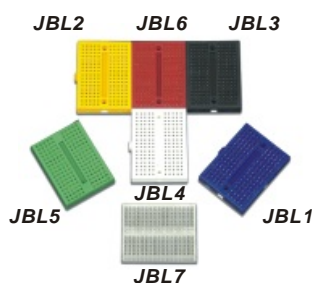
ML SERIES



Model	Dimension(mm)			Holes	Terminal holes	Terminal strips	Distribution holes	Distribution strips	Binding post
	L	W	H						
ML-01	170	12	8	100	—	—	100	1	—
ML-10	170	38	8	630	630	1	—	—	—
ML-11	170	40	8	730	630	1	100	1	—
ML-12	170	62	8	830	630	1	200	2	—
ML-21B	220	120	9	830	630	1	200	2	2
ML-24B	220	165	9	1660	1260	2	400	4	3
ML-35B	220	120	9	2390	1890	3	500	5	4
ML-47B	220	165	9	3220	2520	4	700	7	4

JOINABLE BLOCKS

170 terminal holes, 7 colours, joinable



M21-500



Features

- .Low cost but ideal tool for breadboard
- .With DC power supply for common use



M21-500

Technical Data	M21-500
DC Output Voltage	0~+15VDC/500mA
	0~-15VDC/500mA
	+5VDC/1A
Solderless Breadboard	2390 tie points
Input Voltage	110~127VAC±10% 60Hz, 220~240±10% 50Hz Switchable
Dimensions(W×H×D)	200×80×250mm
Weight	4.5kg

M21-600



Features

- .Low cost but ideal tool for breadboard
- .With DC, AC power supply for common use



M21-600

Technical Data	M21-600
DC Output Voltage	0~+15VDC/500mA
	0~-15VDC/500mA
	+5VDC/1A
	-5VDC/500mA
AC Output Voltage	12V-6V-0-6V-12V, 300mA
Solderless Breadboard	2820 tie points
Input Voltage	110~127VAC±10% 60Hz, 220~240±10% 50Hz Switchable
Dimensions(W×H×D)	334×95×258mm
Weight	4.5kg

M21-1000 SERIES



Features

- .Provide available electrical components and interconnect in different configurations.
- .Acquire the basic knowledge on electrical engineering, installations and electrical measurements.
- .Study the means to check the main laws and principles.
- .Component symbols and electrical diagrams are represented on the front panel.
- .The symbols and electrical diagrams of each component are clearly represented on the front panel.
- .The connections are eased by 4mm terminals and cables of different colors.
- .The power supplies are included with extra low safety voltage.

Specifications

Main installed components:

- General switch, fuse and signaling lamp
- 1 Safety single-phase transformer 115-230V / 6-12-24 VAC-1 A
- 2 Fuse-holder with fuse type 6x30-1A
- 1 Moving iron ammeter with range: 0.5-1A
- 1 Moving iron voltmeter with range: 25 V
- 10 Resistors of different values
(2 Ω, 4 Ω, 8 Ω, 16 Ω, 31.5 Ω, 63 Ω, 250 Ω, 500 Ω, 1000 Ω, 2000 Ω)
- 1 linear rheostat 100 Ω /25W
- 4 Diodes 6A-100V
- 2 Lamp-holder with 24-V signaling lamp
- 1 24-Vac buzzer
- 1 Electrolytic capacitor, 100 μF 25Vdc
- 2 Electrolytic capacitors, 500 μF 25Vdc
- 2 Inductances 60 mH 0.5 A
- 2 Pushbuttons for general use
- 2 Shunters for general use
- 1 Inverter for general use
- 1 Relay, 2 exchange contacts, 24 Vac coil
- 1 Step-by-step relay, 24-Vac coil (M21-1100)
- 1 Set of 25mm cables with 4-mm plug
- Input Voltage: 110~127VAC ± 10% 60Hz, 220~240 ± 10% 50Hz
Switchable
- Dimensions: 258×95×334 mm
- Weight: 4.5kg



M21-1000



M21-1100

The main exercises which can be carried out are:

- AC voltage and current measurements
- Diode insertion with different configurations Half-wave rectifier, Full-wave rectifier, Bridge rectifier, Voltage doublers
- DC voltage and current measurements
- Insertion of resistances with different configurations Resistance measurements, Checking the Ohm's law, Series resistors, voltage divider, Parallel resistors, current divider, series and parallel resistors, max. power transfer, Kirchoff's principle, superimposition principle, Thevenin's theorem
- Power measurements DC power measurement, Joule's law, AC power
- Insertion of capacitors with different configurations Charge and discharge of a DC capacitor, series DC capacitors, parallel DC capacitors
- Electromagnetic phenomena Inductance of a coil, coils in series, coils in parallel, Ohmic/inductive/capacitive circuits, RC circuit, RL circuit, series resonant circuit, parallel resonant circuit, Q-factor, coupled circuits, attenuators
- The transformer
- Leveling filters Inductive circuit, capacitive input, LC filter
- Lighting of a lamp with switch
- Lighting of more lamps with switch
- Lighting of a lamp with shunters
- Lighting of a lamp with shunters and inverter
- Lighting of a hotel room
- Lighting of a file room
- Lighting of one or more lamps with relay
- Lighting of one or more lamps with step-by-step relay (M21-1100)
- Acoustic signaling
- Light signaling
- Acoustic/light signaling
- Pulse remote control of a user with relay
- Remote control with self-holding circuit

M21-2000 

Feature

- High level, high quality analog trainer
- Combines all essential function of analog experiment
- With analog meters, digital meters, function generator, potentiometers, speaker and DC power supply

Specification

1. ANALOG METERS:

- A. AC ammeter: 0~1A~5A
- B. AC voltmeter: 0~30V
- C. DC ammeter: 0~100mA~1A
- D. DC voltmeter: 0~30V

2. 3 1/2 DIGITS DIGITAL METERS:

- A. DC ammeter: 0~2000 μ A~2000mA
- B. DC voltmeter: 0~2V~200V

3. FUNCTION GENERATOR:

- (A) Frequency range: 1Hz~10Hz
 10Hz~100Hz
 100Hz~1kHz
 1kHz~10kHz
 10kHz~100kHz

(B) Amplitude

- Sine wave output: 0~10 Vpp variable
- Triangle wave output: 0~10 Vpp variable
- Square wave output: 0~10 Vpp variable

4. POTENTIOMETERS:

- A. Variable resistor VR1 = 100 Ω
- B. Variable resistor VR2 = 1k Ω
- C. Variable resistor VR3 = 10k Ω
- D. Variable resistor VR4 = 100k Ω

5. SPEAKER:

2-1/2 inch diameter, 8 ohm/0.5W to be used for load.

6. POWER SUPPLY:

- A. Fixed DC output: +5V, 500mA
- B. Fixed DC output: -5V, 500mA
- C. Variable DC output: 0 to +15V, 1 A
- D. Variable DC output: 0 to -15V, 1 A
- E. Fixed AC output: 12V-6V-0-6V-12V

7. OTHER STANDARD ACCESSORIES:

- (1) Power cord
- (2) User manual

8. INPUT VOLTAGE: 110~127VAC \pm 10% 60Hz, 220~240 \pm 10% 50Hz Switchable

9. DIMENSIONS(W \times H \times D): 258 \times 95 \times 334mm

10. WEIGHT: 4.5kg



M21-2000

M21-5000



Feature

High level, high quality digital trainer

- Combines all essential function of digital experiment
- With removable breadboard, DC power supply, pulse generator, two pulse switches, digital probe, TTL/CMOS selector and etc.

Specification

1. SOLDERLESS BREADBOARD:

Interconnected with 2820 tie points nickel plated contact, fitted all DIP sizes and all components with lead and solid wire AWG # 22-30 (0.3-0.8mm). It can be changed and replaced for different purpose and can be connected with demonstration panel. Therefore, it is very convenient for both teachers and students.

2. DC POWER SUPPLY:

- Fixed DC output: +5V, 1A
- Fixed DC output: -5V, 1 A.
- Variable DC output: +3V to +15V, 1 A
- Variable DC output: -3V to -15V, 1 A.

3. MODE SELECTOR SWITCH:

When the switch is put on "TTL" or "CMOS" position, the input or output of pulse generator, pulser switches, 8 bits data switches digital probe, 8 bit LED display will meet the HI or LO level of "TTL" or "CMOS".

4. TWO DIGITS OF 7 SEGMENT LED DISPLAY:

5. PULSE GENERATOR:

- Duty cycle: 50%
- Frequency range:
 - 1Hz ~ 10Hz
 - 10Hz ~ 100Hz
 - 100Hz ~ 1kHz
 - 1kHz ~ 10kHz
 - 10kHz ~ 100kHz
 - 100kHz ~ 1MHz

(C) Amplitude: 0 ~ 10Vpp

(D) TTL/CMOS mode output

TTL: +4V

CMOS: + VDC (depend on the + VDC output)

6. SIXTEEN BITS LED DISPLAY:

Set mode selector switch to "TTL" position

Logic Level	Input level	Display light up
LO	$<0.8 \pm 0.2V$	Green
HI	$>2.3 \pm 0.2V$	Red
Open	0.8 ~ 2.3	No display

Set mode selector switch to "CMOS" position

Logic Level	Input level	Display light up
LO	$<30\% + VDC \pm 10\%$	Green
HI	$>70\% + VDC \pm 10\%$	Red
Open	30% ~ 70% + VDC	No display

7. TWO PULSE SWITCH:

A, /A, B, /B output

Output level:

TTL: HI=4V LO=0.1V

CMOS: HI=+VDC LO=0.1V

8. SIXTEEN DATA SWITCHES:

TTL: HI=4V LO=0V

CMOS: HI=+VDC LO=0V

9. DIGITAL PROBES:

Set mode selector switch to "TTL" position

Logic Level	Input level	Display light up
LO	$<0.8 \pm 0.2V$	L
HI	$>2.3 \pm 0.2V$	H
Open	0.8 ~ 2.3	O
Transit	LO-->HI	P

Set mode selector switch to "CMOS" position

Logic Level	Input level	Display light up
LO	$<30\% + VDC \pm 10\%$	L
HI	$>70\% + VDC \pm 10\%$	H
Open	30% ~ 70% + VDC	O
Transit	LO-->HI	P

Memory: the two points of LED beside 7 segment LED display will keep lighting when they are in "level transition" (LO-->HI or HI-->LO)

10. OTHER STANDARD ACCESSORIES:

- Power cord
- Pin: 10cm 20pcs/20cm 20pcs
- User manual

11. Input Voltage: 110~127VAC $\pm 10\%$ 60Hz, 220~240 $\pm 10\%$ 50Hz Switchable

12. DIMENSIONS (W×H×D): 258×95×334mm

13. WEIGHT: 4.5kg



M21-5000

M21-7000

Feature

- . High level, high quality digital-analog trainer
- . Combines all essential function of analog and digital experiment
- . With removable breadboard, DC power supply, function generator, two pulse switches, 2 1/2 inch 8 ohm 0.5W speaker and etc.

Specification

1. SOLDERLESS BREADBOARD:
Interconnected with 2820 tie points nickel plated contact, fitted all DIP sizes and all components with lead and solid wire AWG #22-30 (0.3-0.8mm). It can be changed and replaced for different purpose and can be connected with demonstration panel. Therefore, it is very convenient for both teachers and students.
2. DC POWER SUPPLY:
A. Fixed DC output: +5V, 1A
B. Fixed DC output: -5V, 1A
C. Variable DC output: 0V to +15V, 1A.
D. Variable DC output: 0V to -15V, 1A.
3. POTENTIOMETERS:
A. Variable resistor VR1 = 1kΩ
B. Variable resistor VR2 = 100kΩ
4. FUNCTION GENERATOR:
(A) Frequency range: 1Hz—10Hz
10Hz—100Hz
100Hz—1kHz
1kHz—10kHz
10kHz—100kHz
(B) Amplitude
Sine wave output: 0—10 Vpp variable
Triangle wave output: 0—10 Vpp variable
Square wave output: 0—10 Vpp variable
TTL mode output: 4 Vpp
5. SIXTEEN BITS DATA SWITCHES:
16 pcs toggle switches and corresponding output point. When switch is set at “down” position, the output is LO level; contrarily, it is to be HI level while setting at “up” position.
6. TWO PULSE SWITCH:
(WITH 2 SET OF OUTPUT: (A⁻, A^{B-}, B))
2 pcs pushbuttons contain switches debouncer for eliminating the bounce caused by switch from “open” to “close” or from “close” to “open” position.
7. SPEAKER:
2-1/2 inch diameter, 8 ohm/0.5W to be used for load.
8. FOUR CHANNEL ADAPTOR:
Both of the two banana sockets' and two BNC jacks' point tips are changeable. It is suitable for M21-7000 to be connected with peripherals.
9. TWO DIGITS OF 7 SEGMENT LED DISPLAY:
(A) Output display
Numerical designs and resultant displays



M21-7000

(B) Function tables

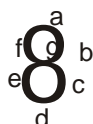
Decimal Or Function	Inputs				Outputs						
	D	C	B	A	a	b	c	d	e	f	g
0	L	L	L	L	L	L	L	L	L	L	H
1	L	L	L	H	H	L	L	H	H	H	H
2	L	L	H	L	L	L	H	L	L	H	L
3	L	L	H	H	L	L	L	L	H	L	L
4	L	H	L	L	H	L	L	H	H	L	L
5	L	H	L	H	L	H	L	L	H	L	L
6	L	H	H	L	H	H	L	L	L	L	L
7	L	H	H	H	L	L	L	H	H	H	H
8	H	L	L	L	L	L	L	L	L	L	L
9	H	L	L	H	L	L	L	H	H	L	L
10	H	L	H	L	H	H	H	L	L	H	L
11	H	L	H	H	H	H	L	L	H	H	L
12	H	H	L	L	H	L	H	H	H	L	L
13	H	H	L	H	L	H	H	L	H	L	L
14	H	H	H	L	H	H	H	L	L	L	L
15	H	H	H	H	H	H	H	H	H	H	H

10. SIXTEEN BITS LED DISPLAY:
16 red LED's separate input terminals. The LED will be lighted up when input is at “HI level” ,and it will be turned off when it is at no input or at “LO level” .
11. OTHER STANDARD ACCESSORIES:
(1) Power cord
(2) Pin: 10cm 20pcs/20cm 20pcs
(3) User manual
12. INPUT VOLTAGE: 110~127VAC±10% 60Hz, 220~240±10% 50Hz Switchable
13. DIMENSIONS(W×H×D): 258×95×334mm
14. WEIGHT: 4.5kg



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

segment identification



M21-7000 A

Feature

- . High level, high quality digital-analog trainer
- . Combines all essential function of analog and digital experiment
- . With removable breadboard, DC power supply, function generator, two pulse switches, 2 1/2 inch 8 ohm 0.5W speaker and etc.
- . 100MHz universal counter

Specification

1. SOLDERLESS BREADBOARD:

Interconnected with 2820 tie points nickel plated contact, fitted all DIP sizes and all components with lead and solid wire AWG #22-30 (0.3-0.8mm). It can be changed and replaced for different purpose and can be connected with demonstration panel. Therefore, it is very convenient for both teachers and students.

2. DC POWER SUPPLY:

- A. Fixed DC output: +5V, 1A
- B. Fixed DC output: -5V, 1A
- C. Variable DC output: 0V to +15V, 1A.
- D. Variable DC output: 0V to -15V, 1A.

3. POTENTIOMETERS:

- A. Variable resistor VR1 = 1k Ω
- B. Variable resistor VR2 = 100k Ω

4. UNIVERSAL COUNTER

- A. Frequency range: 1Hz~99.999999MHz;
- B. Period range TH & TL: 0.01 μ s~999999.99 μ s;
1 μ s~99999999 μ s
- C. Input signal: TTL or CMOS level or any level
($V_{min} \geq +2.3V_p \pm 10\%$)
- D. Display: 8-digit 7-segment LED
- E. Counter switch: External/ internal

5. FUNCTION GENERATOR:

- (A) Frequency range: 1Hz~2MHz
- (B) Amplitude
 - Sine wave output: 0~10 Vpp variable
 - Triangle wave output: 0~10 Vpp variable
 - Square wave output: 0~10 Vpp variable
 - TTL mode output: 4 Vpp

6. SIXTEEN BITS DATA SWITCHES:

16 pcs toggle switches and corresponding output point. When switch is set at "down" position, the output is LO level; contrarily, it is to be HI level while setting at "up" position.

7. TWO PULSE SWITCH:

(WITH 2 SET OF OUTPUT: (A, A \bar , B, B \bar))
2 pcs pushbuttons contain switches debouncer for eliminating the bounce caused by switch from "open" to "close" or from "close" to "open" position.

8. SPEAKER:

2-1/2 inch diameter, 8 ohm/0.5W to be used for load.

9. FOUR CHANNEL ADAPTOR:

Both of the two banana sockets' and two BNC jacks' point tips are changeable. It is suitable for M21-7000 to be connected with peripherals.

10. TWO DIGITS OF 7 SEGMENT LED DISPLAY:

- (A) Output display
- Numerical designs and resultant displays



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

segment identification



M21-7000A

(B) Function tables

Decimal Or Function	Inputs				Outputs							
	D	C	B	A	a	b	c	d	e	f	g	
0	L	L	L	L	L	L	L	L	L	L	H	
1	L	L	L	H	H	L	L	H	H	H	H	
2	L	L	H	L	L	L	H	L	L	H	L	
3	L	L	H	H	L	L	L	L	H	H	L	
4	L	H	L	L	H	L	L	H	H	L	L	
5	L	H	L	H	L	H	L	L	H	L	L	
6	L	H	H	L	H	H	L	L	L	L	L	
7	L	H	H	H	L	L	L	H	H	H	H	
8	H	L	L	L	L	L	L	L	L	H	L	
9	H	L	L	H	L	L	L	H	H	L	L	
10	H	L	H	L	H	H	H	L	L	H	L	
11	H	L	H	H	H	H	L	L	H	H	L	
12	H	H	L	L	H	L	H	H	L	L	L	
13	H	H	L	H	L	H	H	L	H	L	L	
14	H	H	H	L	H	H	H	L	L	L	L	
15	H	H	H	H	H	H	H	H	H	H	H	

11. SIXTEEN BITS LED DISPLAY:

16 red LED's separate input terminals. The LED will be lighted up when input is at "HI level", and it will be turned off when it is at no input or at "LO level".

12. OTHER STANDARD ACCESSORIES:

- (1) Power cord
- (2) Pin: 10cm 20pcs/20cm 20pcs
- (3) User manual

13. INPUT VOLTAGE: 110~127VAC \pm 10% 60Hz, 220~240 \pm 10% 50Hz Switchable

14. DIMENSIONS (W \times H \times D): 258 \times 95 \times 334mm

15. WEIGHT: 4.5kg

Replaceable 4 pin connector

M21-7100

Feature

- High level, high quality digital-analog trainer
- Replaceable 4 pin connector, easy to maintenance
- Combines all essential function of analog and digital experiment
- With removable breadboard, DC power supply, function generator, two pulse switches, 2 1/2 inch 8 ohm 0.5W speaker and etc.

Specification

1. SOLDERLESS BREADBOARD:

Interconnected with 2820 tie points nickel plated contact, fitted all DIP sizes and all components with lead and solid wire AWG #22-30 (0.3-0.8mm). It can be changed and replaced for different purpose and can be connected with demonstration panel. Therefore, it is very convenient for both teachers and students.

2. DC POWER SUPPLY:

- A. Fixed DC output: +5V, 1A
- B. Fixed DC output: -5V, 1 A
- C. Variable DC output: 0V to +15V, 1 A.
- D. Variable DC output: 0V to -15V, 1 A.

3. POTENTIOMETERS:

- A. Variable resistor VR1 = 1k Ω
- B. Variable resistor VR2 = 100k Ω

4. FUNCTION GENERATOR:

- (A) Frequency range: 1Hz-10Hz
 10Hz-100Hz
 100Hz-1kHz
 1kHz-10kHz
 10kHz-100kHz

(B) Amplitude

- Sine wave output: 0-10 Vpp variable
- Triangle wave output: 0-10 Vpp variable
- Square wave output: 0-10 Vpp variable
- TTL mode output: 4 Vpp

5. SIXTEEN BITS DATA SWITCHES:

16 pcs toggle switches and corresponding output point. When switch is set at "down" position, the output is LO level; contrarily, it is to be HI level while setting at "up" position.

6. TWO PULSE SWITCH:

(WITH 2 SET OF OUTPUT: (A⁻, A⁺, B⁻, B))
 2 pcs pushbuttons contain switches debouncer for eliminating the bounce caused by switch from "open" to "close" or from "close" to "open" position.

7. SPEAKER:

2-1/2 inch diameter, 8 ohm/0.5W to be used for load.

8. FOUR CHANNEL ADAPTOR:

Both of the two banana sockets' and two BNC jacks' point tips are changeable. It is suitable for M21-7000 to be connected with peripherals.

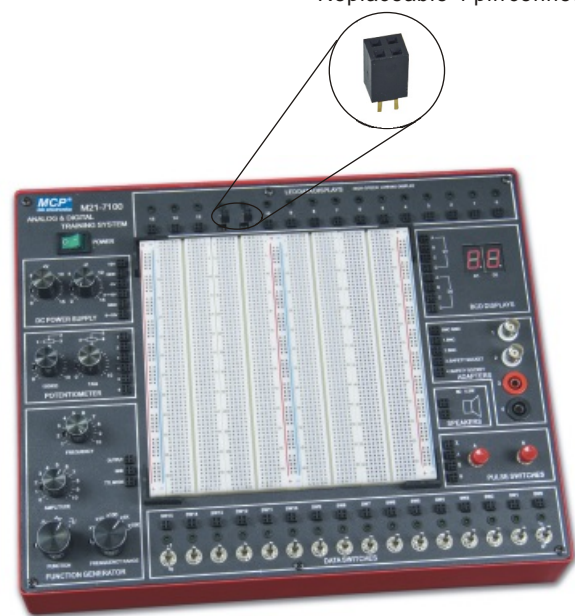
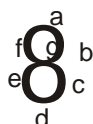
9. TWO DIGITS OF 7 SEGMENT LED DISPLAY:

- (A) Output display
 Numerical designs and resultant displays



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

segment identification



M21-7100

(B) Function tables

Decimal Or Function	Inputs				Outputs						
	D	C	B	A	a	b	c	d	e	f	g
0	L	L	L	L	L	L	L	L	L	L	H
1	L	L	L	H	H	L	L	H	H	H	H
2	L	L	H	L	L	L	H	L	H	L	L
3	L	L	H	H	L	L	L	L	L	H	L
4	L	H	L	L	H	L	L	H	H	L	L
5	L	H	L	H	L	H	L	L	H	L	L
6	L	H	H	L	H	H	L	L	L	L	L
7	L	H	H	H	L	L	L	H	H	H	H
8	H	L	L	L	L	L	L	L	H	L	L
9	H	L	L	H	L	L	L	H	H	L	L
10	H	L	H	L	H	H	H	L	L	H	L
11	H	L	H	H	H	H	L	L	H	H	L
12	H	H	L	L	H	L	H	H	H	L	L
13	H	H	L	H	L	H	H	L	H	L	L
14	H	H	H	L	H	H	H	L	L	L	L
15	H	H	H	H	H	H	H	H	H	H	H

10. SIXTEEN BITS LED DISPLAY:

16 red LED's separate input terminals. The LED will be lighted up when input is at "HI level", and it will be turned off when it is at no input or at "LO level".

11. OTHER STANDARD ACCESSORIES:

- (1) Power cord
- (2) Pin: 10cm 20pcs/20cm 20pcs
- (3) User manual

12. INPUT VOLTAGE: 110~127VAC \pm 10% 60Hz, 220~240 \pm 10% 50Hz Switchable

13. DIMENSIONS(W \times H \times D): 258 \times 95 \times 334mm

14. WEIGHT: 4.5kg

M21-7100 A

Replaceable 4 pin connector

Feature

- . High level, high quality digital-analog trainer
- . Replaceable 4 pin connector, easy to maintenance
- . Combines all essential function of analog and digital experiment
- . With removable breadboard, DC power supply, function generator, two pulse switches, 2 1/2 inch 8 ohm 0.5W speaker and etc.
- . 100MHz universal counter

Specification

1. SOLDERLESS BREADBOARD:

Interconnected with 2820 tie points nickel plated contact, fitted all DIP sizes and all components with lead and solid wire AWG #22-30 (0.3-0.8mm). It can be changed and replaced for different purpose and can be connected with demonstration panel. Therefore, it is very convenient for both teachers and students.

2. DC POWER SUPPLY:

- A. Fixed DC output: +5V, 1A
- B. Fixed DC output: -5V, 1 A
- C. Variable DC output: 0V to +15V, 1A.
- D. Variable DC output: 0V to -15V, 1 A.

3. POTENTIOMETERS:

- A. Variable resistor VR1 = 1k Ω
- B. Variable resistor VR2 = 100k Ω

4. UNIVERSAL COUNTER

- A. Frequency range: 1Hz~99.999999MHz;
10Hz~100.00000MHz
- B. Period range TH & TL: 0.01 μ s~999999.99 μ s;
1 μ s~99999999 μ s
- C. Input signal: TTL or CMOS level or any level
($V_{min} \geq +2.3V_p \pm 10\%$)
- D. Display: 8-digit 7-segment LED
- E. Counter switch: External/ internal

5. FUNCTION GENERATOR:

- (A) Frequency range: 1Hz~2MHz
- (B) Amplitude
 - Sine wave output: 0~10 Vpp variable
 - Triangle wave output: 0~10 Vpp variable
 - Square wave output: 0~10 Vpp variable
 - TTL mode output: 4 Vpp

6. SIXTEEN BITS DATA SWITCHES:

16 pcs toggle switches and corresponding output point. When switch is set at "down" position, the output is LO level; contrarily, it is to be HI level while setting at "up" position.

7. TWO PULSE SWITCH:

(WITH 2 SET OF OUTPUT: (\bar{A} , A, \bar{B} , B))
2 pcs push buttons contain switches debouncer for eliminating the bounce caused by switch from "open" to "close" or from "close" to "open" position.

8. SPEAKER:

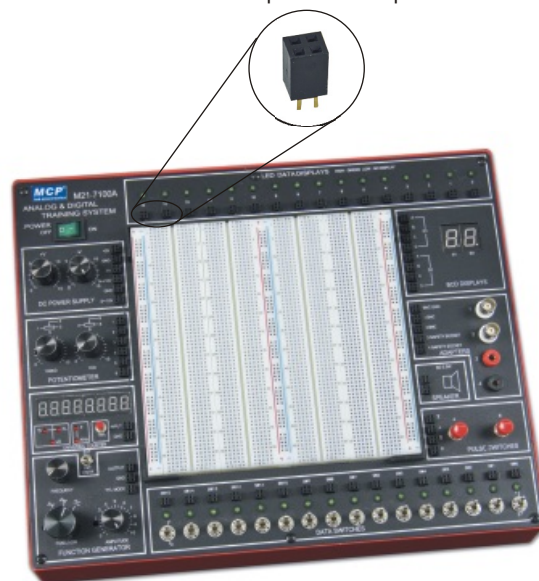
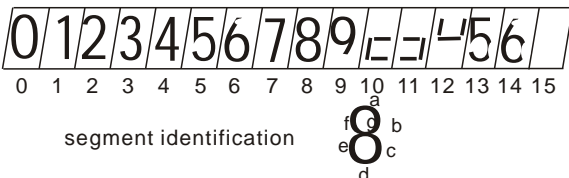
2-1/2 inch diameter, 8 ohm/0.5W to be used for load.

9. FOUR CHANNEL ADAPTOR:

Both of the two banana sockets' and two BNC jacks' point tips are changeable. It is suitable for M21-7000 to be connected with peripherals.

10. TWO DIGITS OF 7 SEGMENT LED DISPLAY:

- (A) Output display
- Numerical designs and resultant displays



M21-7100A

(B) Function tables

Decimal Or Function	Inputs				Outputs							
	D	C	B	A	a	b	c	d	e	f	g	
0	L	L	L	L	L	L	L	L	L	L	H	
1	L	L	L	H	H	L	L	H	H	H	H	
2	L	L	H	L	L	L	H	L	L	H	L	
3	L	L	H	H	L	L	L	L	H	H	L	
4	L	H	L	L	H	L	L	H	H	L	L	
5	L	H	L	H	L	H	L	L	L	H	L	
6	L	H	H	L	H	H	L	L	L	L	L	
7	L	H	H	H	L	L	L	H	H	H	H	
8	H	L	L	L	L	L	L	L	L	L	L	
9	H	L	L	H	L	L	L	H	H	L	L	
10	H	L	H	L	H	H	H	L	L	H	L	
11	H	L	H	H	H	H	L	L	H	H	L	
12	H	H	L	L	H	L	H	H	H	L	L	
13	H	H	L	H	L	H	H	L	H	L	L	
14	H	H	H	L	H	H	H	L	L	L	L	
15	H	H	H	H	H	H	H	H	H	H	H	

11. SIXTEEN BITS LED DISPLAY:

16 red LED's separate input terminals. The LED will be lighted up when input is at "HI level", and it will be turned off when it is at no input or at "LO level".

12. OTHER STANDARD ACCESSORIES:

- (1) Power cord
- (2) Pin: 10cm 20 pcs/20cm 20 pcs
- (3) User manual

13. INPUT VOLTAGE: 110~127VAC $\pm 10\%$ 60Hz, 220~240 $\pm 10\%$ 50Hz Switchable

14. DIMENSIONS (W×H×D): 258×95×334mm

15. WEIGHT: 4.5kg

BASIC DIGITAL CIRCUIT APPLICATE TRAINING SYSTEM

M21-8000



NEW

Feature

.Basic and practical digital circuit trainer

- . Φ 4mm safety socket and test leads for circuit connection
- . Combine basic function of digital experiment and easy application
- . Relatively independent three part of input and output and circuit, clear and definite
- . Theory study also included and self-expansion of more functions

Specification

1. Input components:

Variable voltage: 0~5V
Pulse generator: 0~10Hz
Toggle switch x 2 on-off- (on)
Push switch
Light sensor
Sound sensor
External sensor input socket x 2 set (Φ 4mm and DIN)

2. Output:

LED level display x 6
Buzzer
Relay
Power supply 5V/0.5A

3. Circuit:

Comparator x 2
AND gate x 2
OR gate
NOT gate x 2
RS Flip-Flop
AD converter
Counter
Binary / decimal Encoder and 7 segment LED display

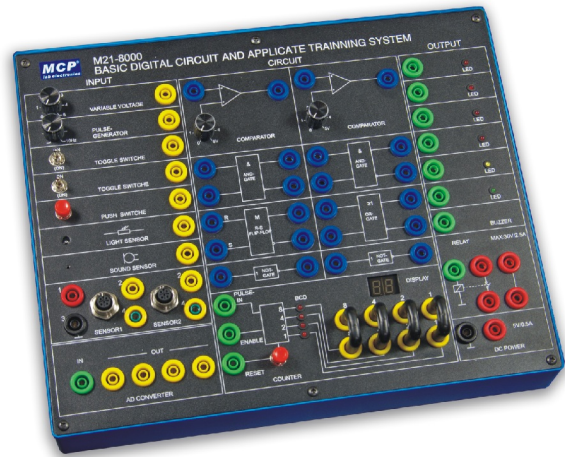
4. Other standard accessories:

Φ 4mm test leads x 10
Power cord
Experiment manual

5. INPUT VOLTAGE: 110~127VAC \pm 10% 60Hz, 220~240 \pm 10% 50Hz Switchable

6. DIMENSIONS(W \times H \times D): 258 \times 95 \times 334mm

7. WEIGHT: 2.0kg



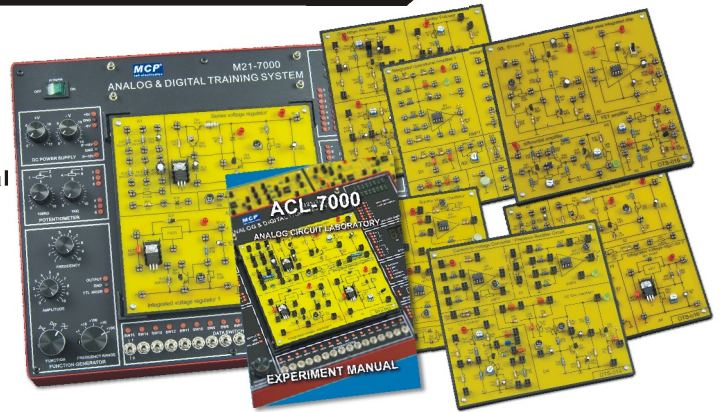
M21-8000

ACL-7000



Feature

- .Six circuit boards form 22 experiments
- .Ideal tool for learning the basics of analog circuits.
- .Step-by-step exercises and application with experiment manual
- .Integrated training system, with complete <INSTRUCTION>.
- .Combination with M21-7000 digital-analog training system as main unit.
- .Expandability and flexibility of experiments greatly increased by large breadboard.
- .Boards can be changed easily.



The ACL-7000 analog circuit laboratory is a comprehensive and self-contained system suitable for tuition and experimentation with a range of analog electronics circuits. All necessary equipments such as power supply, signal generator, switches and displays are built-in on the main unit. The 6 circuitboards cover a wide variety of essential topics in the field of analog electronics. It is a time and cost saving device for both students experiment and researchers interested in developing and testing circuit prototypes.

Specification

I. MAIN UNIT M21-7000

1. SOLDERLESS BREADBOARD:

Interconnected with 2820 tie points nickel plated contact, fitted all DIP sizes and all components with lead and solid wire AWG #22-30 (0.3-0.8mm). It can be changed and replaced for different purpose and can be connected with demonstration panel. Therefore, it is very convenient for both teachers and students.

2. DC POWER SUPPLY:

- A. Fixed DC output: +5V, 1A
- B. Fixed DC output: -5V, 1 A
- C. Variable DC output: 0V to +15V, 1 A.
- D. Variable DC output: 0V to -15V, 1 A.

3. POTENTIOMETERS:

- A. Variable resistor VR1 = 1k Ω
- B. Variable resistor VR2 = 100k Ω

4. FUNCTION GENERATOR:

- (A) Frequency range: 1Hz—10Hz
10Hz—100Hz
100Hz—1kHz
1kHz—10kHz
10kHz—100kHz
- (B) Amplitude
Sine wave output: 0—10 Vpp variable
Triangle wave output: 0—10 Vpp variable
Square wave output: 0—10 Vpp variable
TTL mode output: 4 Vpp

5. SIXTEEN BITS DATA SWITCHES:

16 pcs toggle switches and corresponding output point. When switch is set at “down” position, the output is LO level; contrarily, it is to be HI level while setting at “up” position.

6. TWO PULSE SWITCH:

(WITH 2 SET OF OUTPUT: (\bar{A} , A, \bar{B} , B))
2 pcs pushbuttons contain switches debouncer for eliminating the bounce caused by switch from “open” to “close” or from “close” to “open” position.

7. SPEAKER:

2-1/2 inch diameter, 8 ohm/0.5W to be used for load.

8. FOUR CHANNEL ADAPTOR:

Both of the two banana sockets' and two BNC jacks' point tips are changeable. It is suitable for M21-7000 to be connected with peripherals.



M21-7000

9. TWO DIGITS OF 7 SEGMENT LED DISPLAY:

- (A) Output display
Numerical designs and resultant displays



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

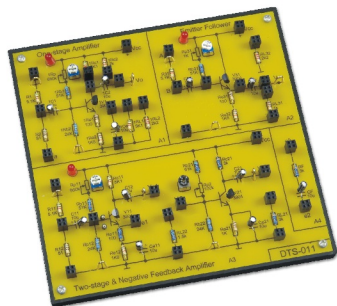


10. SIXTEEN BITS LED DISPLAY:

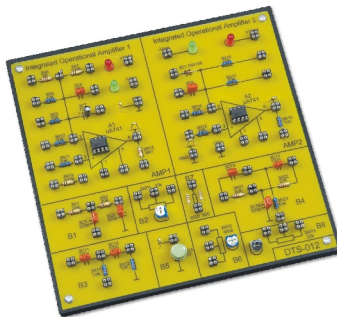
16 red LED's separate input terminals. The LED will be lighted up when input is at “HI level” ,and it will be turned off when it is at no input or at “LO level” .

II. DTS CIRCUIT BOARD

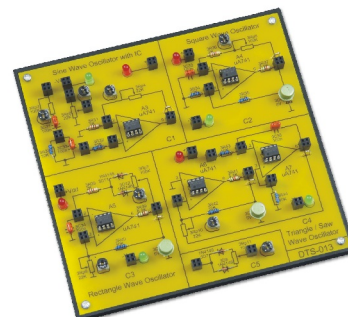
Six circuit boards form 22 experiments detailed in <INSTRUCTION OF DIGITAL CIRCUIT EXPERIMENTATIONS>. Each circuit board contains the experiment circuits which are clearly illustrated by a circuit diagram on its top panel. The circuit boards are as follow :



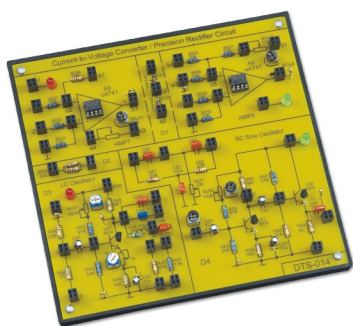
DTS-011 basic amplifier circuit



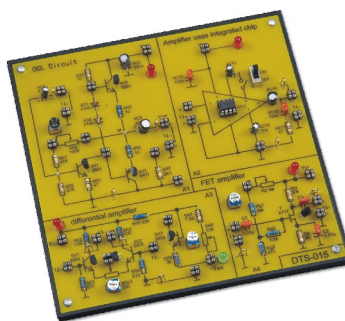
DTS-012 operational amplifier circuit



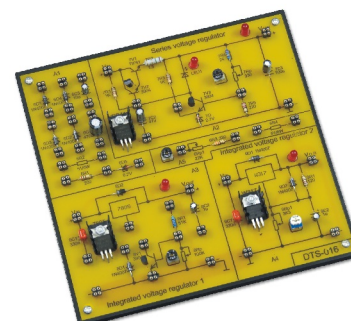
DTS-013 oscillator circuit



DTS-014 various circuit 1



DTS-015 various circuit 2



DTS-016 regulator circuit

III. THE FULL LIST OF EXPERIMENTS PERFORMED USING THE ABOVE CIRCUIT BOARDS

- Experiment 1 Monopole Amplifying Circuit
- Experiment 2 Two Stage Amplifier Circuit
- Experiment 3 Negative Feedback Amplifier Circuit
- Experiment 4 Emitter Follower
- Experiment 5 Differential Amplifier
- Experiment 6 Scaling Summing Amplifier
- Experiment 7 Integrator and Differentiator Amplifier
- Experiment 8 Waveform Generator Circuit
- Experiment 9 Active Filter
- Experiment 10 Voltage Comparator
- Experiment 11 Wien Bridge Oscillator
- Experiment 12 Integrated Power Amplifier
- Experiment 13 Rectifier Filter and Parallel Regulation Circuit
- Experiment 14 Series Regulation Circuit
- Experiment 15 Integrated Voltage Regulator
- Experiment 16 RC Oscillator
- Experiment 17 LC Oscillator and Frequency-selective Amplifier
- Experiment 18 Current/voltage Conversion Circuit
- Experiment 19 Voltage/frequency Conversion Circuit
- Experiment 20 Complementary Symmetry Power Amplifier
- Experiment 21 Waveform Conversion Circuit
- Experiment 22 FET Amplifier

IV. GENERAL

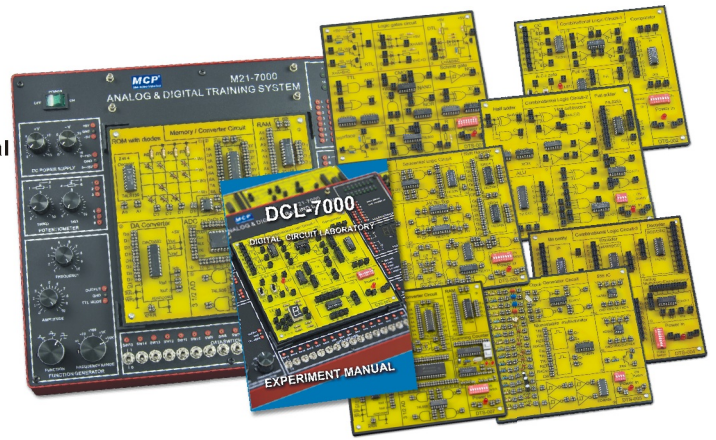
1. Accessories
 - (1) Power cord
 - (2) Pin leads: 10cm 20pcs, 20cm 20pcs
 - (3) User manual+ instruction of analog circuit experimentations
2. INPUT VOLTAGE: 110~127VAC \pm 10% 60Hz, 220~240VAC \pm 10% 50Hz Switchable
3. DIMENSIONS:
 - (1) Main unit(W \times H \times D):258 \times 95 \times 334mm
 - (2) Circuit board:165 \times 170mm
4. WEIGHT:
 - (1) Main unit:4.5kg
 - (2) Circuit board:0.4kg \times 6

DCL-7000



Feature

- .Seven circuit boards form 19 experiments.
- .Step-by-step exercises and application with experiment manual
- .Suitable for combinational logic, sequential logic, and microprocessor circuit experimentation and design.
- .Ideal tool for learning the basics of digital logic circuits.
- .Integrated training system, with complete<INSTRUCTION>.
- .Combination with M21-7000 digital-analog training system as main unit.
- .Expandability and flexibility of experiments greatly increased by large breadboard.
- .Board can be changed easily.



The DCL-7000 digital circuit laboratory is a comprehensive and self-contained system suitable for tuition and experimentation with a range of digital electronics circuits. All necessary equipments for digital logic experiments such as power supply, signal generator, switches and displays are built-in on the main unit. The 7 circuit boards cover a wide variety of essential topics in the field of digital logic. It is a time and cost saving device for both students experiment and researchers interested in developing and testing circuit prototypes.

Specification

I. MAIN UNIT M21-7000

1. SOLDERLESS BREADBOARD:

Interconnected with 2820 tie points nickel plated contact, fitted all DIP sizes and all components with lead and solid wire AWG #22-30 (0.3-0.8mm). It can be changed and replaced for different purpose and can be connected with demonstration panel. Therefore, it is very convenient for both teachers and students.

2. DC POWER SUPPLY:

- A. Fixed DC output: +5V, 1A
- B. Fixed DC output: -5V, 1A
- C. Variable DC output: 0V to +15V, 1A.
- D. Variable DC output: 0V to -15V, 1A.

3. POTENTIOMETERS:

- A. Variable resistor VR1 = 1k Ω
- B. Variable resistor VR2 = 100k Ω

4. FUNCTION GENERATOR:

- (A) Frequency range: 1Hz—100Hz
 - 10Hz—100Hz
 - 100Hz—1kHz
 - 1kHz—10kHz
 - 10kHz—100kHz

(B) Amplitude

- Sine wave output: 0—10 Vpp variable
- Triangle wave output: 0—10 Vpp variable
- Square wave output: 0—10 Vpp variable
- TTL mode output: 4 Vpp

5. SIXTEEN BITS DATA SWITCHES:

16pcs toggle switches and corresponding output point. When switch is set at “down” position, the output is LO level; contrarily, it is to be HI level while setting at “up” position.

6. TWO PULSE SWITCH:

(WITH 2 SET OF OUTPUT: \bar{A} , A, \bar{B} , B)
2pcs pushbuttons contain switches debouncer for eliminating the bounce caused by switch from “open” to “close” or from “close” to “open” position.

7. SPEAKER:

2-1/2 inch diameter, 8 ohm/0.5W to be used for load.

8. FOUR CHANNEL ADAPTOR:

Both of the two banana sockets' and two BNC jacks' point tips are changeable. It is suitable for M21-7000 to be connected with peripherals.



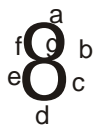
M21-7000

9. TWO DIGITS OF 7 SEGMENT LED DISPLAY:

- (A) Output display
Numerical designs and resultant displays



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

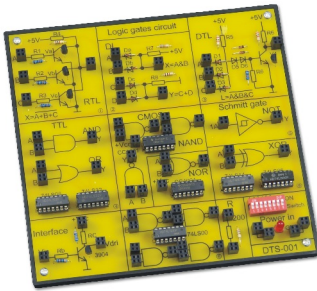


10. SIXTEEN BITS LED DISPLAY:

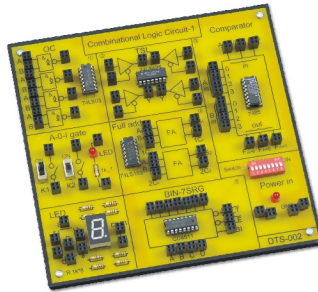
16 red LED's separate input terminals. The LED will be lighted up when input is at “HI level” ,and it will be turned off when it is at no input or at “LO level” .

II.DTS CIRCUIT BOARD

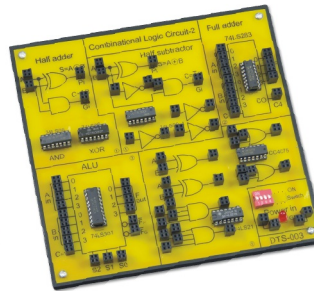
Seven circuit boards form 19 experiments detailed in <INSTRUCTION OF DIGITAL CIRCUIT EXPERIMENTATIONS> Each circuit board contains the experiment circuits which are clearly illustrated by a circuit diagram on its top panel. The circuit boards are as follow :



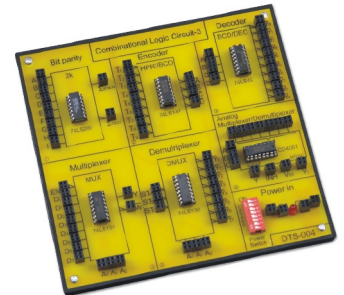
DTS-001 logic gates circuit



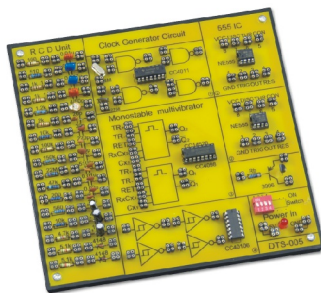
DTS-002 combinational logic circuit-1



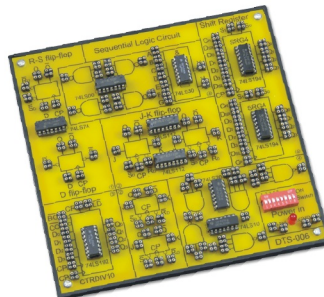
DTS-003 combinational logic circuit-2



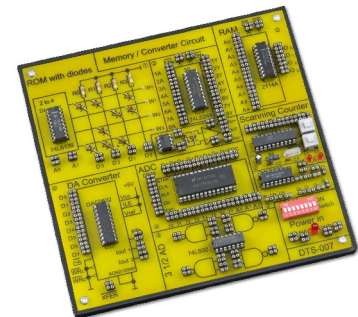
DTS-004 combinational logic circuit-3



DTS-005 clock generator circuit



DTS-006 sequential logic circuit



DTS-007 memory / converter circuit

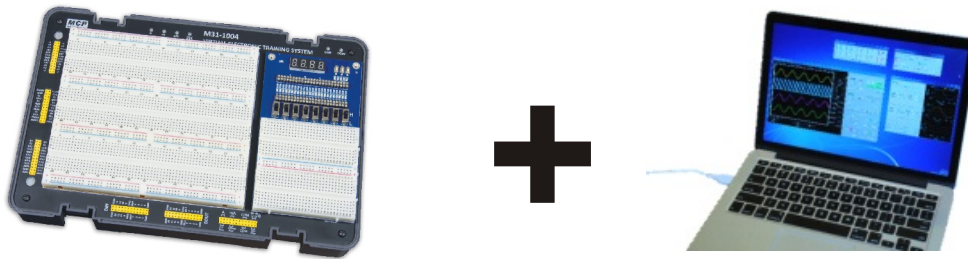
III.THE FULL LIST OF EXPERIMENTS PERFORMED USING THE ABOVE CIRCUIT BOARDS

- | | |
|---------------|---|
| Experiment 1 | Transistor Switching Characteristics |
| Experiment 2 | Logic Function and Parameter test of TTL Integrated Logic Gate |
| Experiment 3 | Logic Functions and Parameter Test of CMOS Logic Gate |
| Experiment 4 | Verify Function of Logic Gate |
| Experiment 5 | Integration Logic Circuit Connection and Drive |
| Experiment 6 | Applications of TTL Gates with Open-collector Outputs and Tri-state Outputs |
| Experiment 7 | Digital Comparator Circuit |
| Experiment 8 | Arithmetic Operation Circuit |
| Experiment 9 | Parity Generator |
| Experiment 10 | Encoder and Decoder |
| Experiment 11 | Data Selector and Distributor |
| Experiment 12 | Use Gate to Produce Pulse Signal (Multivibrator) |
| Experiment 13 | Monostable Trigger and Schmitt Trigger (Pulse Delay and Waveform Shaping Circuit) |
| Experiment 14 | 555 Timer and Its Application |
| Experiment 15 | Trigger (flip-flop) and Its Application |
| Experiment 16 | Shift Register IC and Its Application |
| Experiment 17 | IC Counter and Its Application |
| Experiment 18 | Random Access Memory 2114A and Its Application |
| Experiment 19 | D/A and A/D converter |








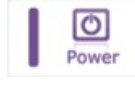
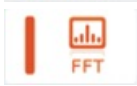



IV.GENERAL

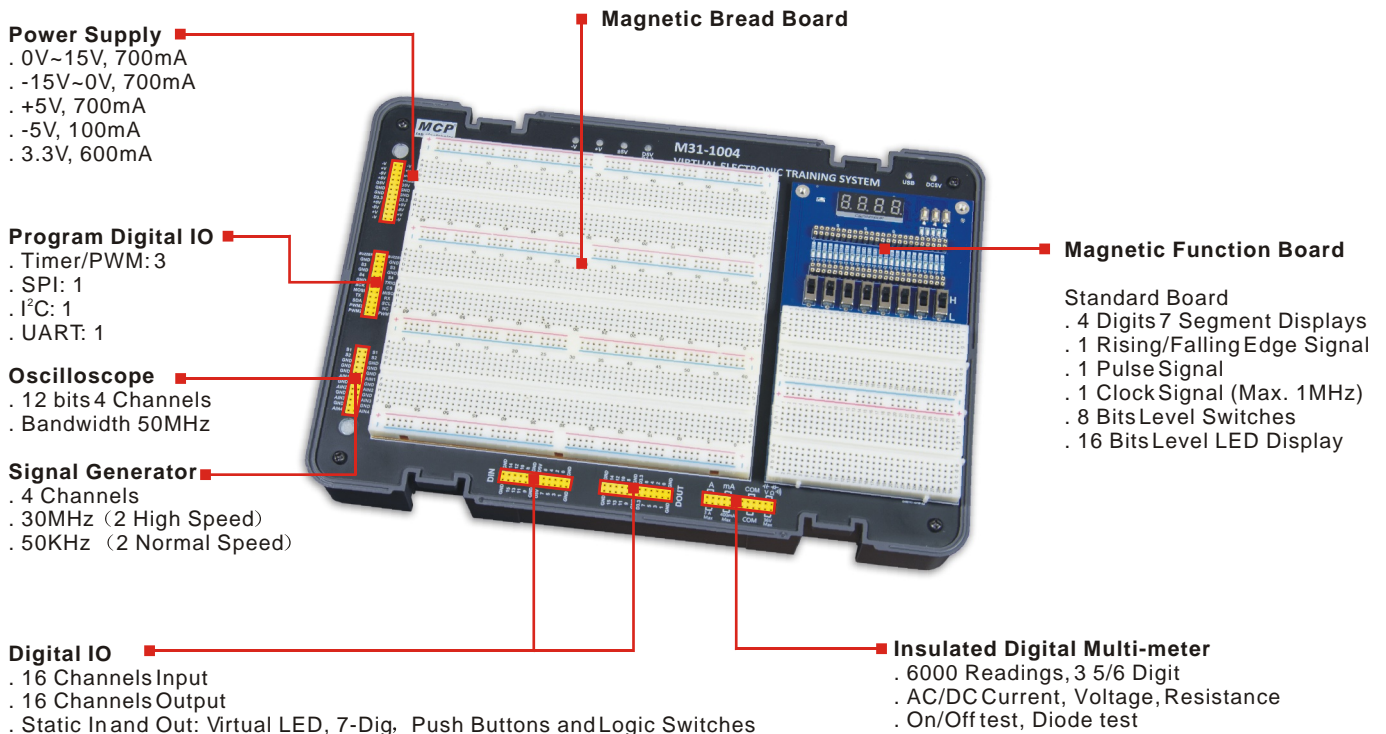
1. Accessories
 - (1) Power cord
 - (2) Pin leads: 10cm 20pcs, 20cm 20pcs
 - (3) User manual+instruction of analog circuit experimentations
2. INPUT VOLTAGE: 110~127VAC±10% 60Hz, 220~240VAC±10% 50Hz Switchable
3. DIMENSIONS:
 - (1) Main unit (W×H×D): 258×95×334mm
 - (2) Circuit board: 165×170mm
4. WEIGHT:
 - (1) Main unit: 4.5kg
 - (2) Circuit board: 0.4kg×7

M31-1000 SERIES VIRTUAL ELECTRONIC TRAINING SYSTEM



12 Main Functions All in One

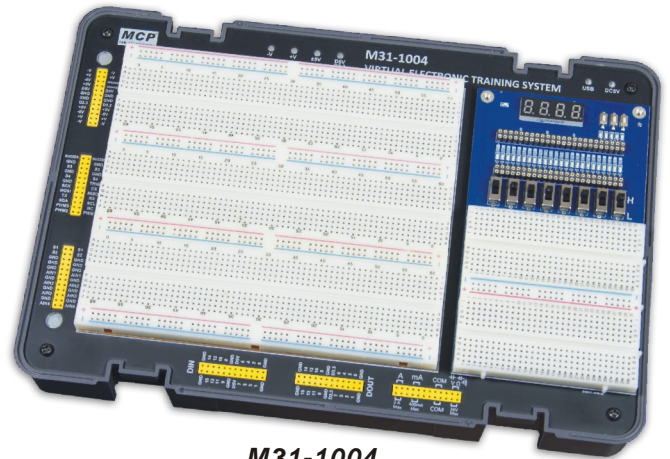
- | | | | |
|--|---|--|---|
|  | Insulated 3 5/6 Digit Multi-meter |  | Bode Analyzer |
|  | 4 Channels Oscilloscope |  | 16 Channels Logical Analyzer |
|  | 4 Channels Signal Generator |  | 16 Channels Pulse Signal Generator |
|  | Data Acquisition Card |  | $\pm 3V \sim \pm 15V, \pm 5V, 3.3V$ |
|  | Spectrum Analyzer |  | PI2All-USB to SPI, I ² C, UART, PWM & GPIO |
|  |  | Static In and Out: Virtual LED, 7-Dig, Push Buttons and Logic Switches | |



M31-1000 SERIES NEW

Features

- .Max. 50MHz bandwidth, 100MSa/s sampling rate (Oscilloscope)
- .Max. 30MHz sine wave output (Signal generator)
- .Arbitrary waveform output
- .16 channel digital input output
- .Digital multimeter
- .Office report, source data save
- .USB2.0 interface, no external power source required,easy to use
- .Operating system: Windows XP or above
- .Easy to carry



M31-1004

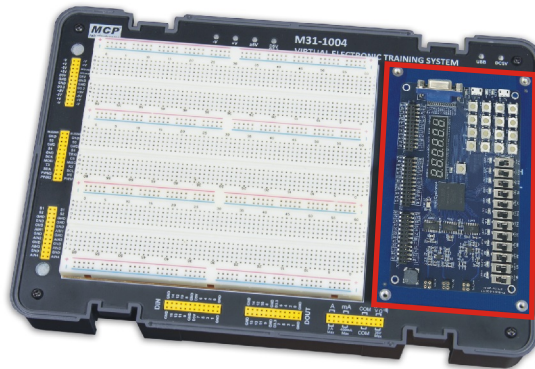
Technical Data

Oscilloscope	Channels	4
	Sampling rate	100MSa/s@4CH
	Bandwidth	50MHz
	ADC resolution	12bit
	Time base range	10ns~10s
	Vertical resolution	10mV/div~5V/div
	Input coupling	AC/DC
	Max. input voltage	±25V
	Vertical resolution(Accuracy)	10mV/div ~ 5V/div (±1%)
	Trigger mode	Auto, normal and single
	Trigger source:	CH1~CH4
	Trigger level adjustable	Yes
	Math	+, -, ×, ÷, FFT
Signal generator	Channels	4 (2 Main channel, 2 secondary channel)
	DAC resolution	12bit
	Max. frequency (sine)	30MHz (Main channel) 50KHz (Secondary channel)
	Wave form	Sine, Triangle, Square, DC, Arbitrary
	Output range	±0.5mV~±5V
Spectrum analyzer	Channel	1
	ADC resolution	12bit
	Bandwidth	50MHz
	Sampling rate	100MSa/s
	Voltage range	±25V
	Auto measuring	Frequency, SNR, THD, V-Peak
Other measuring	Hanning, B-H, RMS, Peak Hold	
Logical analyzer	Channels	16
	Max. Input voltage	5V
	Max. Sampling rate	50MSa/s@4CH 20MSa/s@8CH 10MSa/s@16CH
	Max. Sampling depth	1000 points / 500s
Pulse generator	Channels	16
	Refresh rage	10MSa/s
	Output signal level	3.3V, 5V
	Inner/Ext. Trigger select	Yes
Digital multimeter	Voltage range / Accuracy	0.1mV~36V / 1%
	Current range / Accuracy	0.1uA~600uA / 1% 0.1mA~400mA / 1% 100mA~3A / 1%
	Resistance range / Accuracy	0.1Ω~40MΩ / 1%
	Capacitor range / Accuracy	0.1nF~4mF / 2%~5%
	On/Off test	Yes
Power output	Output range	±1.8V~±15V, fixed ±5V, fixed 3.3V
	Rated current	±700mA (±1.8V~±15V), 700mA (fixed+5V), -100mA (fixed-5V), 600mA (fixed 3.3V)
	Protection	Shout cut / over current

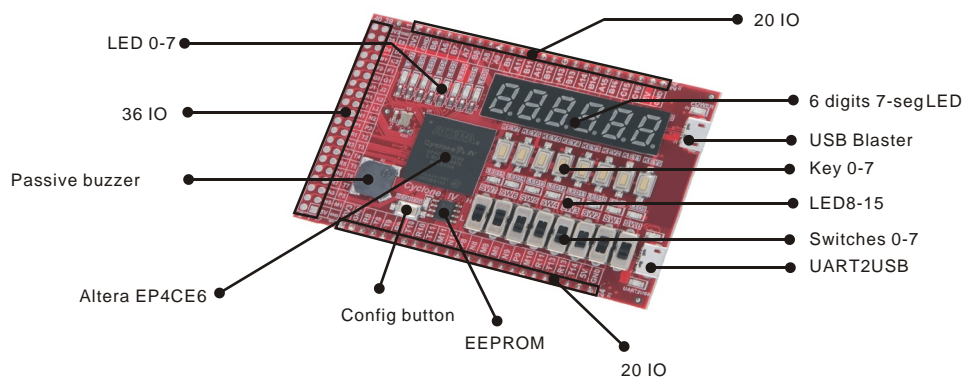
Interface: USB 2.0
 Power source: USB
 Dimensions (W×H×D): 290×40×195 mm
 Weight: 1.5kg

M31-1000 SERIES FPGA EXPAND EXPERIMENT BOARD

NEW

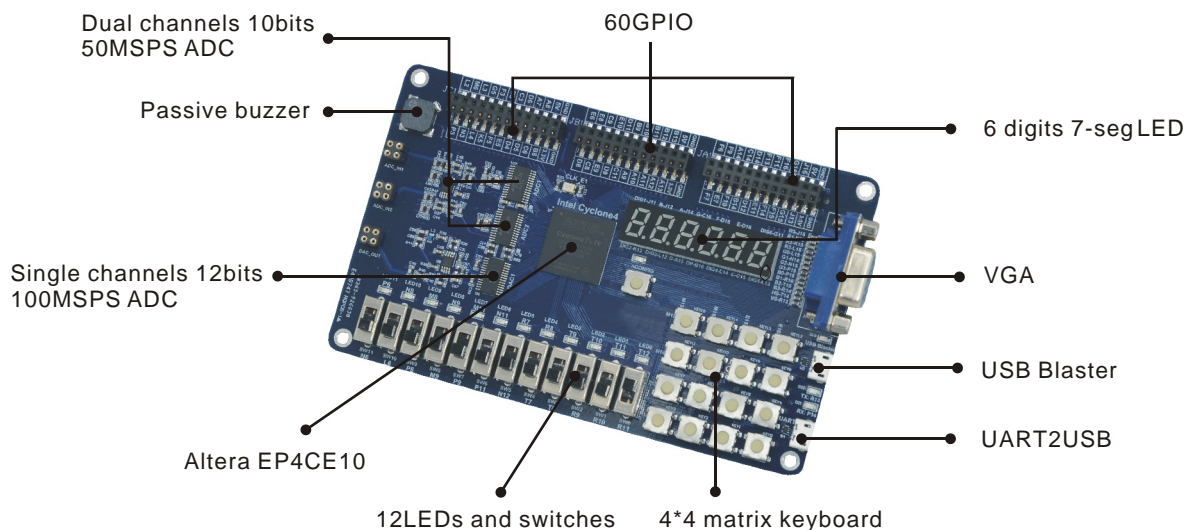


M31-0001 FPGA EXPERIMENT BOARD



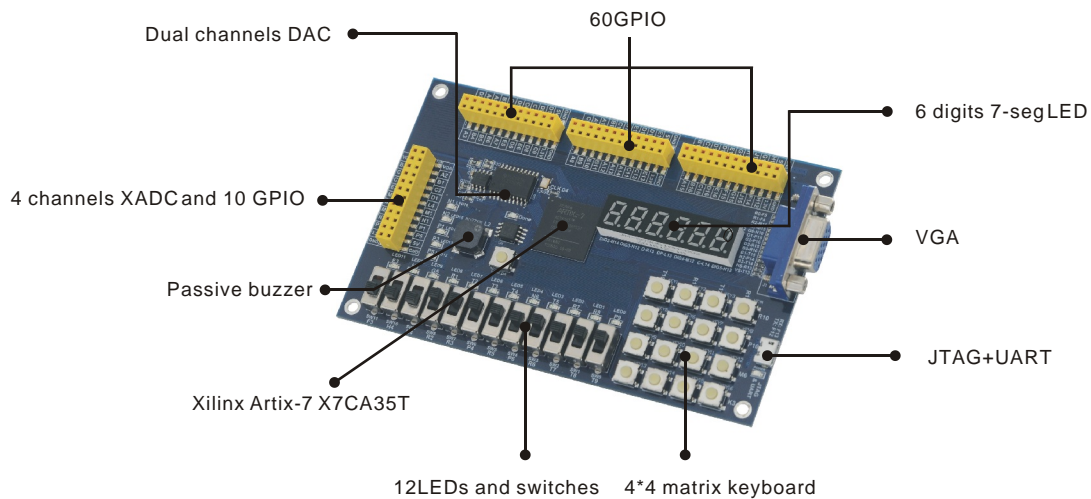
- .Altera EP4CE6 FPGA chip with EPCS16 configuration chip, 50MHz timer.
- .On board USB Blaster for downloading and power supply.
- .1 passive buzzer, 6 digits 7-segment display, 16 LEDs, 8 switches, 8 input keyboard and 76GPIO.

M31-0002 FPGA EXPERIMENT BOARD



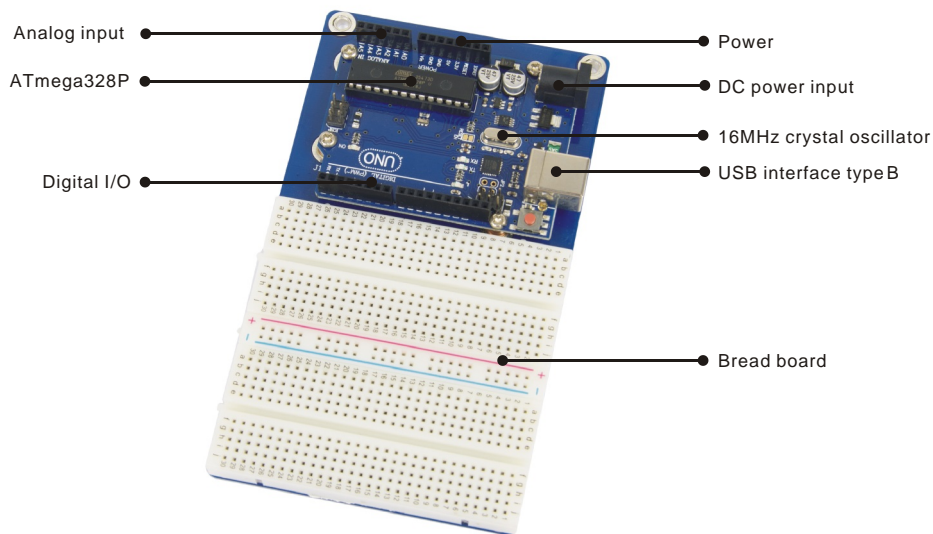
- .Altera EP4CE10 FPGA chip with EPCS16 configuration chip, 50MHz timer and 16Mbits input.
- .On board USB Blaster for downloading and power supply.
- .1 passive buzzer, 6 digits 7-segment display, 1 VGA output, 1 UAT2USB, 12 LEDs with 12 switches, 4*4 matrix keyboard, 60GPIO.
- .1 Dual channels 10bits 50MSPS ADC and 1 Single channel 12bits 100MSPS DAC for signal processing.

M31-0003 FPGA EXPERIMENT BOARD



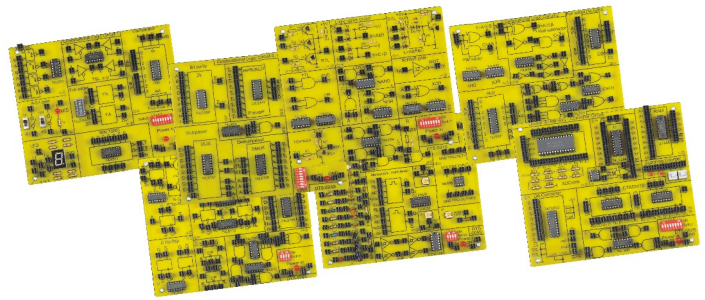
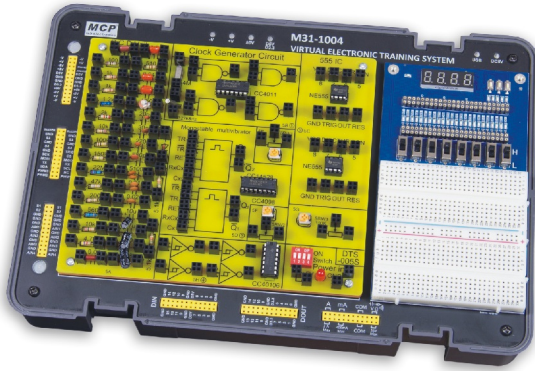
- .Xilinx Artix-7 X7CA35T FPGA chip with 50MHz timer input and 32Mbits configuration chip
- .VIVADO fully support
- .On board JTAG + UART combination USB circuit for downloading, UAT2USB and power supply.
- .1 passive buzzer, 6 digits 7-segment display, 1 VGA output, 12 LEDs with 12 switches, 4*4 matrix keyboard, 70GPIO.
- .1 Dual channels DAC and 4 channels XADC inputs

M31-0004 ARDUINO UNO EXPERIMENT BOARD

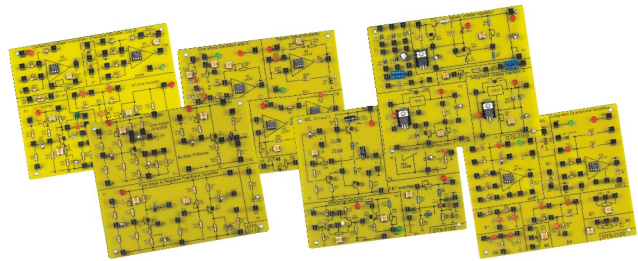


- .ATmega328P microcontroller.
- .5V operating voltage.
- .7-12V Input voltage (9V recommended).
- .14 digital I/O pins (of which 6 provide PWM output), 6 PWM digital I/O pins, 6 analog Input pins.
- .32 KB (ATmega328P) flash memory (0.5 KB used by bootloader)
- .2KB (ATmega328P) SRAM, 1KB (ATmega328P)EEPROM
- .16 Mhz clock speed
- .1 bread board

M31-1000 SERIES WITH ACL AND DCL EXPERIMENT BOARDS **NEW**



DCL-7000 EXPERIMENT BOARDS



ACL-7000 EXPERIMENT BOARDS

ACL-7000 SUPPORTED EXPERIMENT

- Experiment 1 Monopole Amplifying Circuit
- Experiment 2 Two Stage Amplifier Circuit
- Experiment 3 Negative Feedback Amplifier Circuit
- Experiment 4 Emitter Follower
- Experiment 5 Differential Amplifier
- Experiment 6 Scaling Summing Amplifier
- Experiment 7 Integrator and Differentiator Amplifier
- Experiment 8 Waveform Generator Circuit
- Experiment 9 Active Filter
- Experiment 10 Voltage Comparator
- Experiment 11 Wien Bridge Oscillator
- Experiment 12 Integrated Power Amplifier
- Experiment 13 Rectifier Filter and Parallel Regulation Circuit
- Experiment 14 Series Regulation Circuit
- Experiment 15 Integrated Voltage Regulator
- Experiment 16 RC Oscillator
- Experiment 17 LC Oscillator and Frequency-selective Amplifier
- Experiment 18 Current/voltage Conversion Circuit
- Experiment 19 Voltage/frequency Conversion Circuit
- Experiment 20 Complementary Symmetry Power Amplifier
- Experiment 21 Waveform Conversion Circuit
- Experiment 22 FET Amplifier

DCL-7000 SUPPORTED EXPERIMENT

- Experiment 1 Transistor Switching Characteristics
- Experiment 2 Logic Function and Parameter test of TTL Integrated Logic Gate
- Experiment 3 Logic Functions and Parameter Test of CMOS Logic Gate
- Experiment 4 Verify Function of Logic Gate
- Experiment 5 Integration Logic Circuit Connection and Drive
- Experiment 6 Applications of TTL Gates with Open-collector Outputs and Tri-state Outputs
- Experiment 7 Digital Comparator Circuit
- Experiment 8 Arithmetic Operation Circuit
- Experiment 9 Parity Generator
- Experiment 10 Encoder and Decoder
- Experiment 11 Data Selector and Distributor
- Experiment 12 Use Gate to Produce Pulse Signal (Multivibrator)
- Experiment 13 Monostable Trigger and Schmitt Trigger (Pulse Delay and Waveform Shaping Circuit)
- Experiment 14 555 Timer and Its Application
- Experiment 15 Trigger (flip-flop) and Its Application
- Experiment 16 Shift Register IC and Its Application
- Experiment 17 IC Counter and Its Application
- Experiment 18 Random Access Memory 2114A and Its Application
- Experiment 19 D/A and A/D converter

BXS SERIES

Feature

- . 100 scale division to show the resistance setting
- . Enclose in robust sheet metal cover
- . Good linearity
- . Sliding contact of coppers graphite

Specifications

- . Max. Working Voltage: 380VAC, 400VDC
- . Resistance tolerance: $\pm 10\%$
- . Insulation resistance: $>3 \times 10^9 \Omega$
- . Earthing resistance: $<0.1 \Omega$
- . Rated resistance: see table

**BXS 600**

Model	Power VA	Resistance (Ω)	Max. Current	Dimensions (W×H×D)	Ceramic Pipe diameter	Weight (kg)
BXS 150	160	10	4A	285×140×95mm	47mm	1.8
		33	2.2A			
		100	1.25A			
		330	0.7A			
		1000	0.4A			
		3300	0.22A			
BXS 300	320	3.3	10A	385×140×95mm	47mm	2.4
		10	5.7A			
		33	3.1A			
		100	1.8A			
		330	1.0A			
		1000	0.57A			
BXS 600	640	3300	0.31A	485×160×100mm	64mm	3.2
		10000	0.18A			
		1.6	20A			
		5	11.4A			
		16.5	6.2A			
		50	3.6A			
BXS 600	640	165	2A	485×160×100mm	64mm	3.2
		500	1.1A			
		1650	0.63A			
		5000	0.36A			

BXD SERIES



Feature

- . 100 scale division to show the resistance setting
- . Good linearity
- . Fused safety socket of the slide bar
- . Enclose in robust sheet metal cover
- . Sliding contact of coppers graphite
- . More tighter structure
- . New appearance design

Specifications

- . Max. working voltage: 380VAC, 400VDC
- . Resistance tolerance: $\pm 10\%$
- . Insulation resistance: $> 3 \times 10^9 \Omega$
- . Earthing resistance: $< 0.1 \Omega$
- . Rated resistance: see table



BXD160



BXD300

Model	Power VA	Resistance (Ω)	Max. Current	Dimensions (W×H×D)	Ceramic Pipe diameter	Weight kg
BXD160	160	3.3	7A	240×180×195mm	64mm	2.2
		10	4A			
		33	2.2A			
		100	1.25A			
		330	0.7A			
		1000	0.4A			
		3300	0.22A			
BXD300	320	3.3	10A	380×180×100mm	64mm	2.8
		10	5.7A			
		33	3.1A			
		100	1.8A			
		330	1.0A			
		1000	0.57A			
		3300	0.31A			
BXD600	640	10000	0.18A	480×180×100mm	64mm	3.5
		1.6	20A			
		5	11.4A			
		16.5	6.2A			
		50	3.6A			
		165	2A			
		500	1.1A			
1650	0.63A					
5000	0.36A					

RXG250 SERIES SOLENOID



Features

.Simple application allows you to perform various manipulations

- .Influence of L, I and the number of turns
- .Axial guide for teslameter probes

Specifications

- .Pipe length: 500mm
- .Pipe material: Ceramic
- .Pipe diameter: 50mm
- .Windings material: Copper wires
- .Dimensions: 620(W)×100(H)×120(D)mm
- .Weight: 3kg



RXG250



RXG250B



RXG250T

Model	Windings	Windings diameter	I _{max}	Intermediary terminals
RXG250	2×250T	0.92mm	7A(parallel)	×
RXG250B	500T	0.92mm	3.5A	×
RXG250T	250T+250T	1.0mm, 0.77mm	3.5A	✓

DIDACTIC VARIABLE INDUCTOR RXI-1

Features

- .Inductor equipped with 4mm safety socket and the whole unit is double insulated

Specifications

- Variable inductance: 0.1~1.4H
- No. of turns: 3500 in 16 layers
- Resistance: 18 Ω
- Max. current: 2A
- Wire diameter: φ 1.0mm
- Core: Soft iron φ 40mm x 180mm
- Graduation: Henry and centimeter
- Dimension: 290×160×105mm
- Weight: 4.2kg



RXI-1

TM206 TESLAMETER



Features

.Measuring BX and BZ at the same time

- .Biaxial probe removable and graduation provided
- .Double sensors protection
- .2 ranges of measure: 20 mT or 200mT
- .Analog output

Specifications

- .Range: 20mT
200mT
- .Display: 2000 digits LCD
- .Resolution: 10 μT
- .Accuracy: 2%Rdg ± 3 digits (20mT)
2%Rdg ± 1 digit (100mT)
- .Analog: Sensitivity: 10mV/mT(20mT)
1mV/mT(100mT)
Impedence: 4.7kΩ
Connection: safety socket φ4mm
- .Power supply: 110~127VAC±10% 60Hz, or 220~240VAC±10% 50Hz
- .Dimensions: 230(W)×85(H)×240(D)mm
- .Weight: 1kg



TM206

BXR SERIES RESISTOR BOX



Features

- .High accuracy to 1%
- .Economical, high performance high resistance decade for all laboratory
- .Plastic cabinet for better insulation

BXR-04 Specifications

Decade	Range	Max. Current	Dimension(mm) (L×W×H)	Weight
1	1Ω~10Ω	700mA	190×140×80	0.5kg
2	10Ω~100Ω	200mA		
3	100Ω~1kΩ	70mA		
4	1kΩ~10kΩ	20mA		



BXR-04

BXR-05 Specifications

Decade	Range	Max. Current	Dimension(mm) (L×W×H)	Weight
1	1Ω~10Ω	700mA	190×140×80	0.5kg
2	10Ω~100Ω	200mA		
3	100Ω~1kΩ	70mA		
4	1kΩ~10kΩ	20mA		
5	10kΩ~100kΩ	7mA		



BXR-05

BXR-06 Specifications

Decade	Range	Max. Current	Dimension(mm) (L×W×H)	Weight
1	1Ω~10Ω	700mA	170×240×90	0.8kg
2	10Ω~100Ω	200mA		
3	100Ω~1kΩ	70mA		
4	1kΩ~10kΩ	20mA		
5	10kΩ~100kΩ	7mA		
6	100kΩ~1MΩ	1mA		



BXR-06

BXR-07 Specifications

Decade	Range	Max. Current	Dimension(mm) LxWxH	Weight
1	1Ω~10Ω	700mA	170x240x90	0.8Kg
2	10Ω~100Ω	200mA		
3	100Ω~1kΩ	70mA		
4	1kΩ~10kΩ	20mA		
5	10kΩ~100kΩ	7mA		
6	100kΩ~1MΩ	1mA		
7	1MΩ~10MΩ	0.11mA		



BXR-07

BXL-07 INDUCTOR BOX



Features

- .High accuracy to 5% (decade 1-6); 10% (decade 7)
- .Economical, high performance high resistance decade for all laboratory
- .Plastic cabinet for better insulation



BXL-07

BXL-07 Specifications

Decade	Range	Max. DC Current	Dimension (mm) (L×W×H)	Weight
1	1 μH~10 μH	300mA	170×240×90	1.2kg
2	10 μH~100 μH	200mA		
3	100 μH~1mH	100mA		
4	1mH~10mH	100mA		
5	10mH~100mH	70mA		
6	100mH~1H	50mA		
7	1H~10H	40mA		

BXC-05 CAPACITOR BOX



Features

- .High accuracy to 5%
- .Economical, high performance high resistance decade for all laboratory
- .Plastic cabinet for better insulation



BXC-05

BXC-05 Specifications

Decade	Range	Max. Voltage	Dimension (mm) (L×W×H)	Weight
1	0.1nF~1nF	300V _{DC} /230V _{AC} (50Hz)	170×240×90	0.8kg
2	1nF~10nF			
3	10nF~100nF			
4	100nF~1 μF			
5	1 μF~10 μF			

RM-7 RESISTOR MATRIX



Features

- .New design and convenience operation
- .High accuracy to 1%
- .Plastic cabinet for better insulation

Specifications

Range:	0~11.111M Ω (1 Ω steps) with seven decades
Accuracy:	1%
Wattage:	0.5W
Internal stray resistor:	0.3 Ω
Dimensions:	190×140×80 mm
Weight:	400g



RM-7

CM-5 CAPACITOR MATRIX



Features

- .New design and convenience operation
- .High accuracy to 5%
- .Plastic cabinet for better insulation

Specifications

Range:	0~11.111 μ F (100pF steps) with five decades
Accuracy:	5%
Voltage limit:	50VDC (non-polarized capacitor)
Internal residual capacitor:	50pF
Dimensions:	190×140×80 mm
Weight:	350g



CM-5

IM-4 INDUCTOR MATRIX



Features

- .New design and convenience operation
- .High accuracy to 5%
- .Plastic cabinet for better insulation

Specifications

Range:	0~111.1mH (10 μ H steps) with four decades
Accuracy:	5%
Current limit:	100mA
Internal stray inductor:	0.6 μ H
Dimensions:	190×140×80 mm
Weight:	450g



IM-4

DBR SERIES RESISTOR BOX



Features

.High accuracy to 1%

DBR-06 Specifications

Decade	Range	Max. Current	Dimension(mm) (W×H×D)	Weight
1	$0.1\ \Omega \times 10$	700mA	285×140×215	2.2kg
2	$1\ \Omega \times 10$	700mA		
3	$10\ \Omega \times 10$	200mA		
4	$100\ \Omega \times 10$	70mA		
5	$1000\ \Omega \times 10$	20mA		
6	$10000\ \Omega \times 10$	7mA		



DBR-06

DBR-07 Specifications

Decade	Range	Max. Current	Dimension(mm) (W×H×D)	Weight
1	$0.01\ \Omega \times 10$	700mA	285×140×215	2.2kg
2	$0.1\ \Omega \times 10$	700mA		
3	$1\ \Omega \times 10$	700mA		
4	$10\ \Omega \times 10$	200mA		
5	$100\ \Omega \times 10$	70mA		
6	$1000\ \Omega \times 10$	20mA		
7	$10000\ \Omega \times 10$	7mA		



DBR-07

DBC-05 CAPACITOR BOX



Features

.High accuracy to 2%

DBC-05 Specifications

Decade	Range	Max. Voltage	Dimension(mm) (W×H×D)	Weight
1	$0.1\text{nF} \times 10$	300V _{DC} /230V _{AC} (50Hz)	285×140×215	2.2kg
2	$1\text{nF} \times 10$			
3	$10\text{nF} \times 10$			
4	$100\text{nF} \times 10$			
5	$1\ \mu\text{F} \times 10$			



DBC-05

DBL-06 INDUCTOR BOX



Features

.High accuracy to 2%

DBL-06 Specifications

Decade	Range	Max. Current	Dimension(mm) (W×H×D)	Weight
1	$0.01\text{mH} \times 10$	200mA	285×140×215	2.2kg
2	$0.1\text{mH} \times 10$	100mA		
3	$1\text{mH} \times 10$	100mA		
4	$10\text{mH} \times 10$	70mA		
5	$100\text{mH} \times 10$	50mA		
6	$1\text{H} \times 10$	40mA		



DBL-06

DWB-01 WHEATSTONE BRIDGE



Features

- .Wide measuring range $1\ \Omega$ to $10\text{M}\ \Omega$
- .Built in galvanometer and bridge power source
- .Null measuring method
- .One multiplier and four measuring arms
- .Guarding and shielding with a portable metal case



DWB-01

Electrical characteristics:

Measuring range: $1\ \Omega \sim 11.11\text{M}\ \Omega$

Measuring arm four decade: $1000\ \Omega \times 10 + 100\ \Omega \times 10 + 10\ \Omega \times 10 + 1\ \Omega \times 10$

Multiplier	Measuring range	Accuracy	Bridge power source
$\times 0.001$	$1 \sim 11.11\ \Omega$	$0.5\%^*/0.5\%^{**}$	Internal battery 3V External power 4.5V
$\times 0.01$	$10 \sim 111.1\ \Omega$	$0.2\%^*/0.2\%^{**}$	
$\times 0.1$	$100 \sim 1111\ \Omega$	$0.1\%^*/0.1\%^{**}$	
$\times 1$	$1\text{k} \sim 5\text{k}\ \Omega$	$0.1\%^*/0.1\%^{**}$	
	$5\text{k} \sim 11.11\text{k}\ \Omega$	$0.2\%^*/0.1\%^{**}$	
$\times 10$	$10\text{k} \sim 50\text{k}\ \Omega$	$0.1\%^*/0.1\%^{**}$	Internal battery 3V External power 15V
	$50\text{k} \sim 111.1\text{k}\ \Omega$	$1\%^*/0.1\%^{**}$	
$\times 100$	$100\text{k} \sim 500\text{k}\ \Omega$	$2\%^*/0.2\%^{**}$	
	$500\text{k} \sim 1111\text{k}\ \Omega$	$5\%^*/0.2\%^{**}$	
$\times 1000$	$1\text{M} \sim 11.11\text{M}\ \Omega$	$20\%^*/0.5\%^{**}$	

*Use internal battery power source
**Use external power source

DKB-01 KELVIN BRIDGE



Features

- .Wide measuring range $0.0001\ \Omega$ to $11\ \Omega$
- .Built in standard resistors
- .Built in galvanometer and bridge power source
- .Null measuring method
- .One multiplier and two measuring dials
- .Guarding and shielding with a portable metal case



DKB-01

Electrical characteristics:

Measuring range: $0.0001\ \Omega$ to $11\ \Omega$

Measuring dials: one decade: 0.01×10

one linearity dial: $0.001 \sim 0.01$

Multiplier	Measuring range	Accuracy	Standard resistor	Bridge power source
$\times 100$	$1 \sim 11\ \Omega$	0.2%	$10\ \Omega$	$1.5\text{V} \times 2$
$\times 10$	$0.1 \sim 1.1\ \Omega$	0.2%	$1\ \Omega$	
$\times 1$	$0.01 \sim 0.11\ \Omega$	0.2%	$0.1\ \Omega$	
$\times 0.1$	$0.001 \sim 0.011\ \Omega$	0.5%	$0.01\ \Omega$	
$\times 0.01$	$0.0001 \sim 0.0011\ \Omega$	1%	$0.001\ \Omega$	

General specifications:

Galvanometer(built-in)sensitivity: $0.6\ \mu\text{A}/\text{div.}$, battery: 9V 6F22

Operating temperature: $5 \sim 35^\circ\text{C}$

Humidity range: 85%max., relative

Dimensions: $285 \times 140 \times 215\ \text{mm}$

Weight: 2.5kg

DPM-01 DC POTENTIOMETER

Features

- .Precise measure DC potential or voltage
- .Standard DC potential output for thermal instrumentation calibration
- .Calibrate thermocouple and secondary thermal instrumentation
- .Together with standard resistor, it may measure DC current and resistance
- .Two measuring ranges 0~230mV, 0~46mV
- .Null measuring method with built in galvanometer
- .One multiplier and two measuring dials
- .Guarding and shielding with a portable metal case



DPM-01

Electrical characteristics:

Measuring dials: one stepper: 0~220mV (22 steps)
one linearity dial: 0~10mV

Measure potential or voltage

Multiplier	Measuring range	Resolution	Working current	Accuracy
×1	0~230mV	50uV	5mA	0.1%
×0.2	0~46mV	10uV	1mA	

Potential output

Multiplier	Measuring range	Resolution	Working current	Accuracy
G1	0~230mV	50uV	5mA	0.1%
G0.2	0~46mV	10uV	1mA	

Working power source: 1.5V DC
 Reference voltage source: 9V 6F22
 Galvanometer(built-in)sensitivity: 0.6 μ A/div., battery: 9V 6F22
 Operating temperature: 5~35°C
 Humidity range: 85%max., relative
 Dimensions: 285×140×215 mm
 Weight: 2.5kg

M20-101 EXPERIMENT OF VOLTAGE TRANSFORMER



Features

- . Φ 4mm socket for convenience connecting
- . Digital voltage meter for convenience indicating primary and secondary voltage



M20-101

Specifications:

- . Primary voltage: 0~300V
- . Secondary voltage: 0~30V
- . Display of voltage meter 1: 0~1999V (3 1/2 digits)
- . Display of voltage meter 2: 0~199.9V (3 1/2 digits)
- . Voltage transformer ratio: 10:1
- . Power source: 110~127VAC ± 10% 60Hz or 220~240VAC ± 10% 50Hz
- . Dimensions: 250×80×200mm
- . Weight: 2.5kg

M20-201 EXPERIMENT OF CURRENT TRANSFORMER



Features:

- . Φ 4mm socket for convenience connecting
- . Digital current meter for convenience indicating primary and secondary voltage
- . Three bulbs' socket (W27) for lamp connecting



M20-201

Specifications:

- . Primary current: 0~2A
- . Secondary current: 0~200mA
- . Display of current meter 1: 0~1.999A (3 1/2 digits)
- . Display of current meter 2: 0~199.9mA (3 1/2 digits)
- . Current transformer ratio: 10:1
- . Power source: 110~127VAC ± 10% 60Hz or 220~240VAC ± 10% 50Hz
- . Dimensions: 250×80×200mm
- . Weight: 2.5kg

F5-001 CAPACITOR BOX



Features:

- . Safety moulded piggy-back jumper to make the series and parallel connections easier
- . Non-polar capacitor box

Specifications:

- . 0 to 15 μ F, supplied with 12 jumpers
- . Accuracy: 1%
- . U_{MAX} : 400V
- . Safety sockets: Φ 4mm
- . C (μ F): 0.5-1-2-2-5-5
- . Dimensions(W×H×D): 90×100×160mm
- . Weight: 0.5kg



F5-001

F20-101 DEMONSTRATION ELECTRIC COUNTER BOX



Features:

- . Double insulation for safety using
- . Terminals for current measuring

Specifications:

- . Working voltage: 220V
- . Working frequency: 50Hz
- . Max. Current: 20A
- . 1kWh: 300r/kWh
- . Safety sockets: Φ 4mm
- . Protection: 20A fuse
- . Dimensions(W×H×D): 160×160×130 mm
- . Weight: 0.5kg



F20-101

F4 SERIES EXPERIMENTS BOXES



Features

- . Plastic box can be mounted on other surface
- . Φ 4mm safety socket connection
- . Dimensions (W×H×D): 115×80×130mm

F4-100 series transformer

- . 230VAC input and 0-6VAC-12VAC output
- . 50VA rated power (Max.)
- . Fuse for over current protection



F4-101

F4-200 series current transformer

- . 10A/20A input and 5A output
- . 720V operating voltage (Max.)
- . Working frequency: 50Hz/60Hz
- . Accuracy: 1.0%



F4-201

F4-300 series shunt

- . 20A input and 100mV output
- . Accuracy: 0.5%



F4-301

SAFETY MODULAR TRANSFORMER MDT

Feature

Both primary coil and secondary coil has safety cover
 Primary circuit has standard power socket, fuse and switch
 Secondary circuit has 4 mm safety socket and double isolation

U/I shape stacking silicon core:

CORE MDT-C

Dimension: H 200mm, L 120mm, 40x50mm section
 Weight: 6kg



PRIMARY COIL MDT-P1

.220V power supply
 .440T, Max.I 4A
 .Power socket, switch, fuse
 .Dimension: 110x90x100mm
 .Weight: 0.85kg



PRIMARY COIL MDT-P2

.110V power supply
 .220T, Max.I 8A
 .Power socket, switch, fuse
 .Dimension: 110x90x100mm
 .Weight: 0.85kg



SECONDARY COIL MDT-S1

.Consists of 5 windings in series
 .6T, 12T, 24T, 48T, 96T
 .Max.I 25A, 25A, 13A, 6.6A, 3.3A
 .4 mm safety socket output
 .Double isolation
 .Dimension: 110x90x100mm
 .Weight: 0.85kg



SECONDARY COIL MDT-S2

.Consists of 2 windings in series
 .1000T, 1000T, Max.I 0.8A
 .**Warning:** w/o load, the coil delivers 1000V
 .4 mm safety socket output
 .Double isolation
 .Dimension: 110x90x100mm
 .Weight: 0.85kg



SECONDARY COIL MDT-S3

.Consists of 2 windings in series
 .220T, 220T, Max.I 3.6A
 .**Warning:** w/o load, the coil delivers 220V
 .4 mm safety socket output
 .Double isolation
 .Dimension: 110x90x100mm
 .Weight: 0.85kg



SECONDARY COIL MDT-S4

.Consists of 2 separate coils and each coil has 2 symmetrically windings
 .12T, 12T, 24T, 24T
 .Max.I 25A, 13A
 .4 mm safety socket output
 .Double isolation
 .Dimension: 110x90x100mm
 .Weight: 0.85kg



SINGLE & THREE-PHASE RESISTIVE, CAPACITIVE AND INDUCTIVE LOAD



Features:

- .Steps of 20%
- .DC mode or 220V single phase
- .Three-phase star 380V and delta 220V

Specifications

Model	Character	Power	Resistor	Dimensions (W×H×D)	Weight(kg)	Phase
SRL-1000	Resistive	200W/400W/600W 800W/1000W	242 Ω /121 Ω /81 Ω 61 Ω /48 Ω	200×250×425	8	Single
TRL-3000	Resistive	(200W/400W/600W 800W/1000W) X 3	(242 Ω /121 Ω /81 Ω 61 Ω /48 Ω) X 3	420×250×425	24	Three



SRL-1000



Both SRL-1000 and
TRL-3000 have AC
cooling fan(s) on back panel



TRL-3000

Model	Character	Power	Capacitor	Dimensions (W×H×D)	Weight(kg)	Phase
SCL-1000	Capacitive	200W/400W/600W 800W/1000W	13uF/26uF/39uF 53uF/66uF	150×130×185	1.5	Single
TCL-3000	Capacitive	(200W/400W/600W 800W/1000W) X 3	(13uF/26uF/39uF 53uF/66uF) X 3	300×130×185	3	Three



SCL-1000



TCL-3000

Model	Character	Power	Inductor	Dimensions (W×H×D)	Weight(kg)	Phase
SIL-1000	Inductive	200W/400W/600W 800W/1000W	770mH/385mH/257mH 193mH/154mH	190×150×365	10	Single
TIL-3000	Inductive	(200W/400W/600W 800W/1000W) X 3	(770mH/385mH/257mH 193mH/154mH) X 3	380×150×365	30	Three



SIL-1000



TIL-3000

Note: all the three phase load can be used independently as three single phase loads

P228001



Spectrum lamp holder & power supply

Features

- .8 pins or E27 lamp socket for choice (P228001 & P2281XX series)
- .7 kinds of P2281XX series

Specifications

- .Maximum output current: 1A
- .Lamp housing: 56(W)×190(H)×56(D)mm
- .Tripod rod: 295mm
- .Lamp socket: 8 pins or E27
- .Dimensions(power supply only): 153(W)×115(H)×195(D)mm
- .Weight: 3k



P228001

P2281XX SERIES

Spectral lamps

Specifications

- .Socket: 8 pins or E27

Model	Filling	Current
P228102	He	1A
P228103	Hg	1.2A
P228104	Na	1.2A
P228105	Ne	1.1A
P228106	Zn	1.2A



P2281XX series

P218001



Spectrum tube power supply

Features

- .Spring-contacts in fully insulated fixtures
- .Protective window guarantee secure mounting and reliable operation
- .With safe lock protection: when the safe door opens, the spectrum tube power supply will stops working even the power is still on.
- .13 kinds of P2181XX series

Specifications

- .Voltage: 5000V
- .Maximum current: 10mA
- .Dimensions: 118(W)×375(H)×120(D)mm
- .Weight: 2.8kg



Safe lock protection



P218001

P2181XX SERIES



Spectrum tubes

Specifications

- .Capillary length: 100mm
- .Total length: Approx. 260mm



P2181XXseries

Model	Filling
P218101	Air
P218102	Argon
P218103	Carbon dioxide
P218104	Helium
P218105	Hydrogen
P218107	Krypton
P218108	Mercury
P218109	Neon
P218110	Nitrogen
P218111	Oxygen
P218112	Water vapor
P218113	Xenon

TM801



Features

- .Multiple function
- .Microprocessor controlled
- .Hand hold and rechargeable battery operation



TM801

Introduction

This microprocessor controlled LCD display universal counter can be used for measurement of time intervals, simple pendulum periods, velocity, acceleration, revolutions per second, frequency, pulses etc. It measures time intervals from 0.1 millisecond and frequencies to 20 KHz. The counter is provided with a five-digit LCD display, and a compact case making the apparatus highly suitable for student lab exercises. RJ45 inputs are provided for connection of photogate. Memory is provided for storing measured values.

Specification	
Display	5 digits LCD
Input	RJ45
Start / Stop	from 0.01 s to 12000 s, resolution 0.01s/1s
Collision	A and B passage time from 0.1ms to 19999s, resolution 0.1ms
Acceleration	passage time and A to B time from 0.1ms to 19999s, resolution 0.1ms
Period	from 0.1ms to 19999s, resolution 0.1ms
Frequency / resolution	from 0.1 Hz to 19999Hz / 0.1 Hz
Counter	from 1 count to 19999 counts
Memory storage	10 values
Rechargeable battery	9V/1800mAh
Accessory	photogate P416001, RJ45 cable, Power adapter
Dimensions	165 x 95 x 45 mm (timer) 300 x 206 x 60 mm (box)
Weight	1.0 kg (with box)

Ultrasonic waves experiment system of reflexion CE

Objects

Demonstrating the principle of an echo sounder.
Determining the velocity of sound in air from the transit time of a sound pulse and the distance to the reflecting object.
Determining distance by measuring the transit time of the sound pulse.

Principles

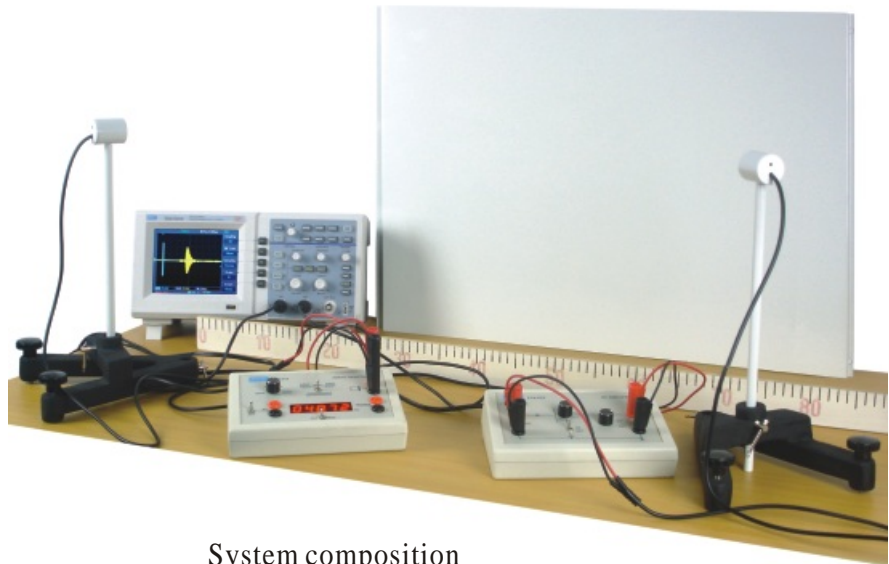
Ultrasonic waves are reflected at the boundary surfaces between media with differing resistances to sound waves. An echo sounder (or sonar) device emits pulsed ultrasonic signals and measures the time in which a signal is reflected from such a boundary surface to the receiver. To simplify the configuration, the transmitter and receiver are in the same location.

The time between transmission and reception can be used to determine the distance to the reflecting object (if the velocity of sound is known), or to determine the velocity of sound over a known distance. This method is commonly used e.g. to determine water depths at sea.

In the experiment, the echo-sounder principle is used to determine the velocity of sound in air, and to determine distances.

Two ultrasonic transducers serve as the transmitter and receiver, depending on their connection.

A piezoelectric body converts electrical to mechanical energy. When the AC voltage is applied to the piezoelectric body, the transducer configured as a transmitter supplies a sufficiently high sound amplitude at a resonance frequencies (approx. 40 kHz). Conversely, sound waves generate mechanical oscillations in the transducer when configured as a receiver. The amplitude of the resulting piezoelectric AC voltage is proportional to the sonic amplitude.



System composition

2 pcs	Ultrasonic transducers 40 kHz	P416000
1 pc	AC amplifier	F16-015
1 pc	Generator 40 kHz	F16-014
1 pc	Digital storage oscilloscope	DQ7202CA
2 pcs	Test leads	PTL927
2 pcs	Stand base, V-shape	P101413
1 pc	Metal scale, 1 m	
1 pc	Reflection plate	

F16-014 Generator 40kHz

Features

With continuance and spacing square wave generator for operating source, for ultrasonic transducer 40kHz (P416000) as an emitter. Inner and external frequency counter

Technical Data

Generator

Frequency range: 40 kHz, can be set from 35 kHz to 50 kHz

Pulse operation:

pulse duration approx. 0.2 ms

pulse spacing approx. 80 ms

Transducer output voltage: >18 Vpp

Trigger output voltage: >9 Vpp

Counter Frequency range:

1 kHz - 150 kHz

Sensitivity: 100 mV

Max. input voltage: 20 V

Connection sockets: 4 mm dia.

Dimensions: 19 cm × 13.5 cm × 7 cm



F16-015 AC-amplifier

Features

Sensitive amplifier with microphone input for verifying ultrasonic waves in conjunction with an ultrasonic transducer (P416000) as a receiver, and sound amplification

Technical Data

Gain: 10× to 1000×, continuously adjustable

Frequency range: 10 kHz (100 Hz microphone input) to 50 kHz

Outputs: signal, trigger and level, short-circuit proof

Max. signal output: 4 Vp-p

Trigger output: TTL compatible

Max. DC level output: 4 V

Connection sockets: 4 mm dia.

Dimensions: 19 cm × 13.5 cm × 7 cm

Weight: 0.5 kg



P416000 Ultrasonic transducer 40 kHz

Features

Piezoelectric air ultrasonic transducer for experiments in the areas of geometric and wave-mechanical acoustics. The transducer is used as transmitter and receiver. In housing, on stand rod, with coax. connection cable.

Technical Data

Resonance frequency: 40 kHz

Bandwidth: approx. 6 kHz

Capacitance: 2000 pF

Connection: 1 m coax. cable with 4 mm sockets

Housing: 48 mm × 27 mm dia.

Stand rod: 20 cm × 10 mm dia.



FINE BEAM TUBE SYSTEM

Objects

Deflection of electrons in a closed circular path inside a magnetic field
Determination of specific charge of an electron e/m

Principles

The fine beam tube is used for investigating the deflection of cathode rays in a uniform magnetic field produced by a pair of Helmholtz coils (P338001). In addition, it can also be used for quantitative determination of the specific charge of an electron e/m .

Located inside a glass bulb with a helium residual gas atmosphere is an electron gun, which consists of an indirectly heated oxide cathode, a Wehnelt cylinder and a perforated anode. The gas atoms are ionized along the path of the electrons and a narrow, well-defined, luminescent beam is produced. Incorporated measurement marks facilitate a parallax-free determination of the diameter of the circular path of the beam deflected in the magnetic field.

SYSTEM A BASIC FINE BEAM TUBE SYSTEM



SYSTEM COMPOSITION

1pc fine beam tube
1pc fine beam tube base
1pc Helmholtz pair of coils
1pc DC power supply

P318001
P328001
P338001
M10-QP500E

**SYSTEM B
COMPLETE FINE BEAM TUBE SYSTEM**



SYSTEM COMPOSITION

1pc fine beam tube
1pc fine beam tube base+ Helmholtz pair of coils
1pc DC power supply
1pc DC power supply
1pc DC power supply

P318001
P328002
M10-SPN300-03C
M10-SPN110-01C
M10-SPM18-3C

Fine beam tube P318001

Gas filling:	Helium
Gas pressure:	1.3hPa
Filament voltage:	4~10V AC/DC
Filament current:	600mA at 6.3V
Focus voltage:-50V	-50V
Anode voltage:	200~300V
Anode current:	<0.3mA
Circular path diameter:	20~100mm
Division spacing:	10mm
Tube diameter:	160mm
Total length:	255mm
Weight:	0.35kg



THOMSON TUBE SYSTEM

Objects

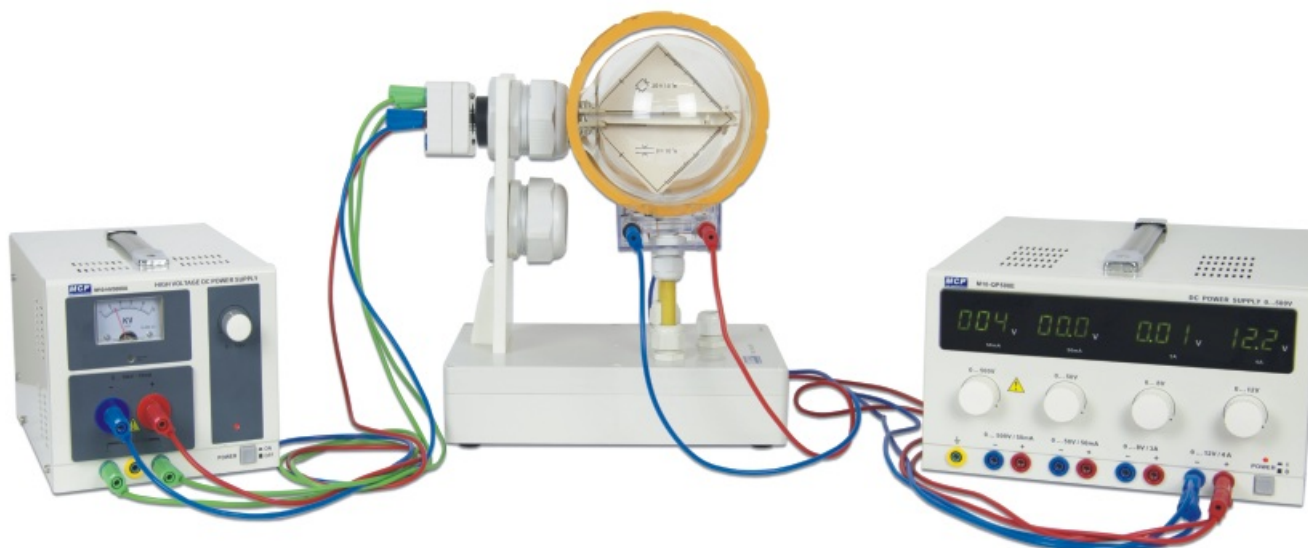
Thermionic emission of electrons
Deflection of electrons in electron and magnetic field
Estimate of specific charge of an electron e/m

Principles

The Thomson tube is intended for investigating the deflection of electron beams in electrical and magnetic fields. It can be used to estimate the specific charge of an electron e/m and to determine the electron velocity v . The Thomson tube comprises an electron gun which emits a narrow, focused ribbon of cathode rays within an evacuated, clear glass bulb. A tungsten filament hot cathode is heated directly and the anode takes the form of a cylinder. The deflection of rays can be achieved electrostatically by means of a built-in plate capacitor formed by the pair of deflection plates or magnetically with the help of the Helmholtz coils (P338002) magnetically.

The cathode rays are intercepted by a flat mica sheet, one side of which is coated with a fluorescent screen and the other side of which is printed with a millimeter graticule so that the path of the electrons can be easily traced. The mica sheet is held at 10 degree to the axis of the tube by the two deflecting plates.

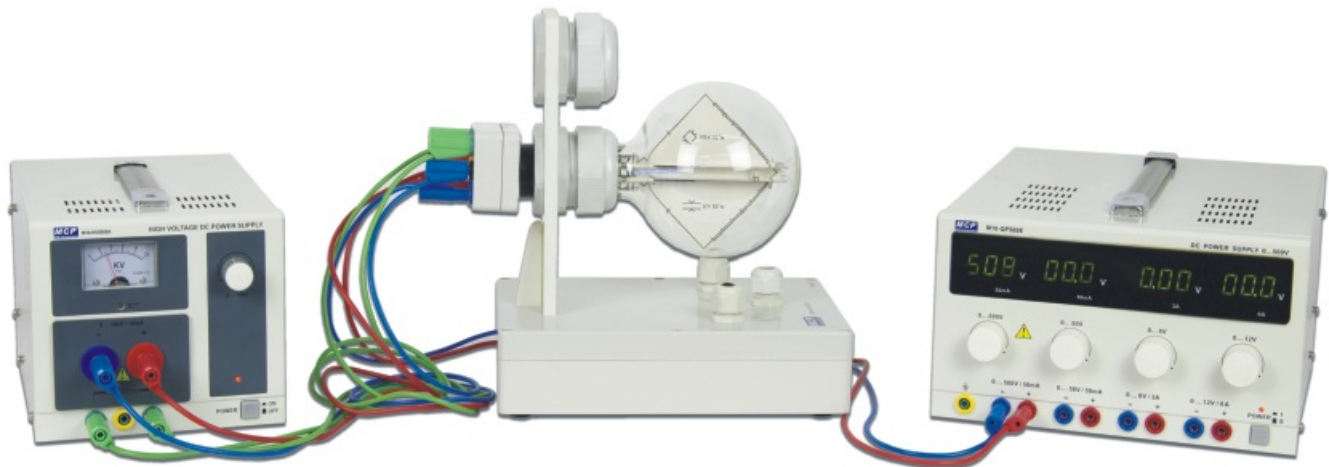
SYSTEM C1 THOMSON TUBE IN MAGNETIC FIELD



SYSTEM COMPOSITION

1pc Thomson tube	P318002
1pc Helmholtz pair of coils	P338002
1pc tube holder	P348001
1pc tube base	P328003
1pc DC power supply	M10-HV5000A
1pc DC power supply	M10-QP500E

**SYSTEM C2
THOMSON TUBE IN ELECTRO STATIC FIELD**



SYSTEM COMPOSITION

1pc Thomson tube	P318002
1pc tube holder	P348001
1pc tube base	P328003
1pc DC power supply	M10-HV5000A
1pc DC power supply	M10-QP500E

Thomson tube P318002

Filament voltage:	6.3V AC
Max. anode voltage:	5000V
Anode current:	approx. 0.1mA at 4000V
Max. capacitor voltage:	500V
Tube diameter:	130mm
Total length:	245mm
Weight:	0.3kg



ELECTRON DEFLECTION TUBE SYSTEM

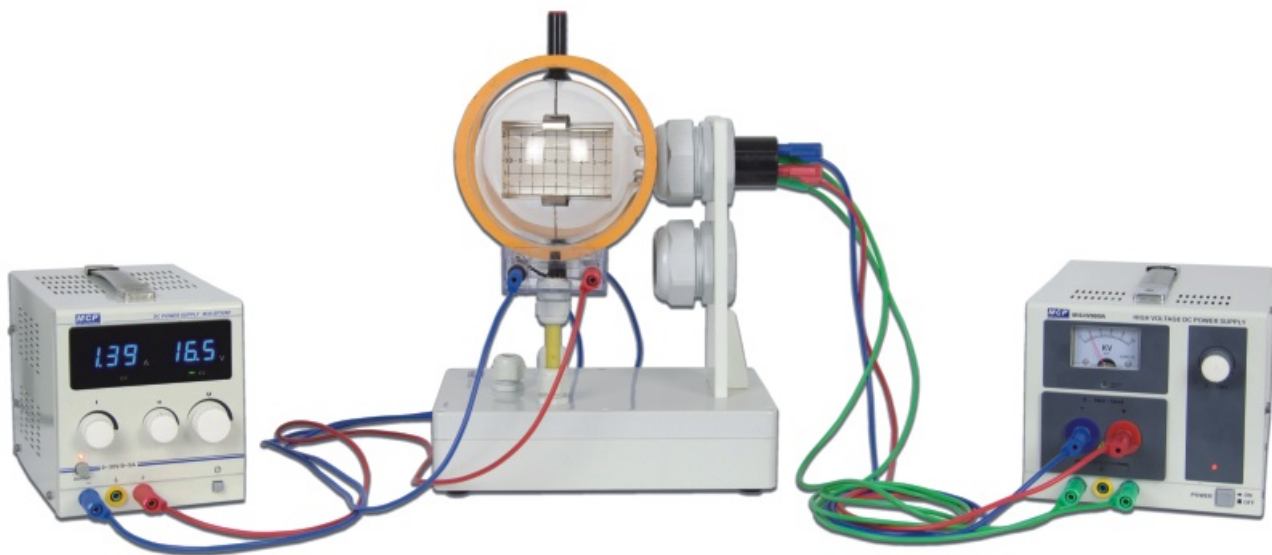
Objects

Thermionic emission of electrons
Deflection of electrons in electric and magnetic field
Estimate of specific charge of an electron e/m

Principles

The electron-beam deflection tube is intended for investigating the deflection of electron beams in electrical and magnetic fields. It can be used to estimate the specific charge of an electron e/m and to determine the electron velocity v . The electron-beam deflection tube comprises an electron gun which emits a narrow, focused ribbon of cathode rays within an evacuated, clear glass bulb. A tungsten filament hot cathode is heated directly and the anode takes the form of a cylinder. The deflection of rays can be achieved electrostatically by means of a built-in plate capacitor formed by the pair of deflection plates or magnetically with the help of the Helmholtz coils (P338002) magnetically. The cathode rays are intercepted by a flat mica sheet, one side of which is coated with a fluorescent screen and the other side of which is printed with a centimeter graticule so that the path of the electrons can be easily traced. The mica sheet is held at 15 degree to the axis of the tube by the two deflecting plates.

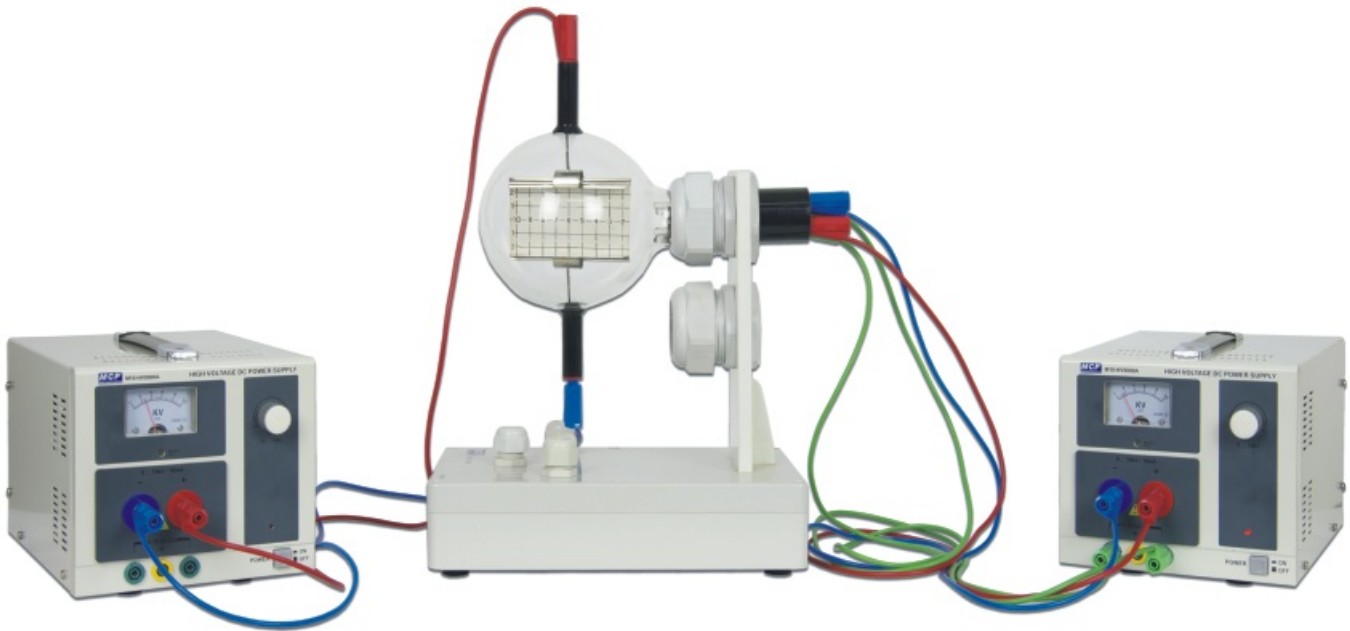
SYSTEM D1 ELECTRON DEFLECTION TUBE IN MAGNETIC FIELD



SYSTEM COMPOSITION

1pc electron deflection tube	P318003
1pc Helmholtz pair of coils	P338002
1pc tube holder	P348001
1pcs DC power supply	M10-HV5000A
1pc DC power supply	M30-SP303E

**SYSTEM D2
ELECTRON DEFLECTION TUBE IN ELECTRO STATIC FIELD**



SYSTEM COMPOSITION

1pc electron deflection tube	P318003
1pc tube holder	P348001
2pcs DC power supply	M10-HV5000A

Electron deflection tube P318003

Filament voltage:	6.3V AC
Max. anode voltage:	5000V
Anode current:	approx. 0.1mA at 4000V
Max. capacitor voltage:	5000V
Tube diameter:	130mm
Total length:	240mm
Weight:	0.3kg



SYSTEM COMPOSITION UNITS SPECIFICATION

Fine beam tube base P328001

Dimension: 160 x 67 x 41mm
Weight: 150 g



Thomson tube base P328003

Dimension: 83 x 58 x 34mm
Weight: 100 g



Fine beam tube base and Helmholtz pair of coils P328002

Dimension: 300 x 400 x 230mm
Weight: 4.5 kg



Helmholtz pair of coils P338001

Number of turns: 124 each
Max. field: 3.8 mT
Coil diameter: 300mm
Rating current: 5A
Effective resistance: 1.2Ω (2.4Ω in series)
Terminals: 4mm safety sockets
Weight: 4 kg



Helmholtz pair of coils P338002

Number of turns: 320 each
Max. field: 4.5mT
Coil diameter: 136mm
Rating current: 1.5A
Effective resistance: 11Ω
Terminals: 4mm safety sockets
Weight: 1 kg



Tube holder P348001

Dimension: 260 x 180 x 290mm
Weight: 1 kg



DC power supply M10-QP500E

Independent four outputs are primarily intended to supply power for electron tube and Helmholtz coils simultaneously.

Output: 0~500VDC/50mA 0~50VDC/50mA
0~8VDC/3A 0~12VDC/4A



DC power supply M10-HV5000A

5000V high-voltage source and 6.3V for operation of electron tube
Output: 0~5000VDC/10mA, 6.3VAC/3A

DC power supply M10-SPN300-03C

300V high-voltage source and 6.3V for operation of electron tube

Output: 0~300VDC/300mA, 6.3VAC/3A



DC power supply M10-SPN110-01C

110V voltage source for focus of electron tube
Output: 0~110VDC/100mA

DC power supply M10-SPM18-3C

3A current source for operation of Helmholtz coils
Output: 0~18VDC/0~3A



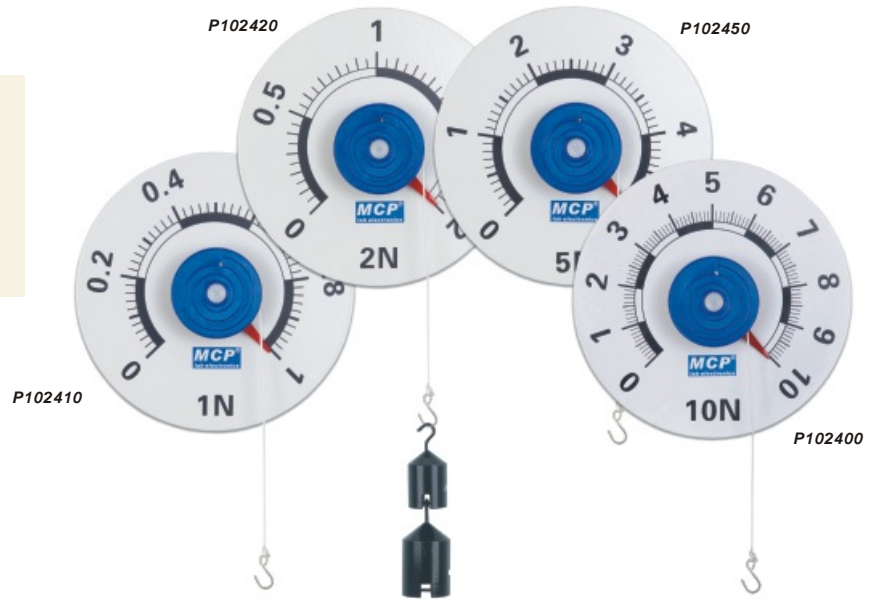
DC power supply M30-SP303E

3A current source for operation of Helmholtz coils
Output: 0~30VDC/0~3A

DYNAMOMETER

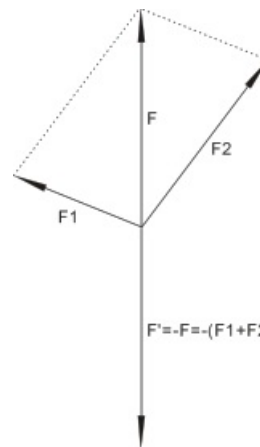
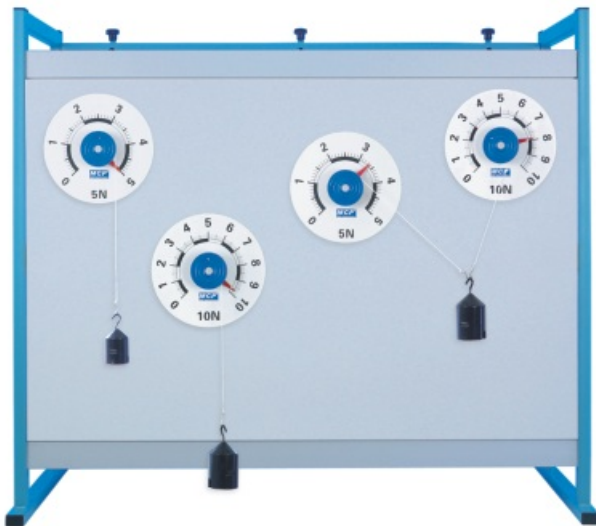
Features:

- .The spring-type dynamometer can be mounted on a magnetized board for the purpose of demonstration.
- .Includes pulley with ball bearing axles and cord groove, cord and hook.
- .Large, easily visible round dial as well as zero-point adjustment.



Specifications:

Force	No.	Scale division	Measuring precision	Diameter	Magnetic base
1N	P102410	0.02N	2.5%	200mm	Ferrite
2N	P102420	0.05N	2.5%	200mm	Ferrite
5N	P102450	0.1N	2.5%	200mm	NdFeB
10N	P102400	0.1N	2.5%	200mm	NdFeB

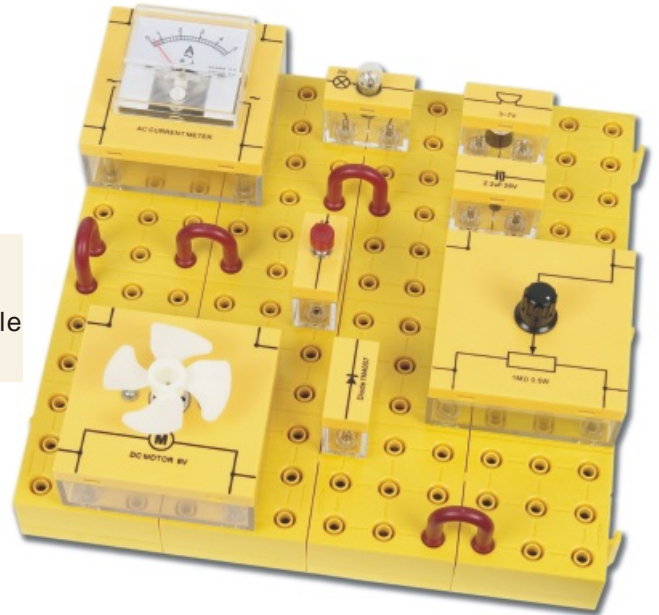


Composition of forces

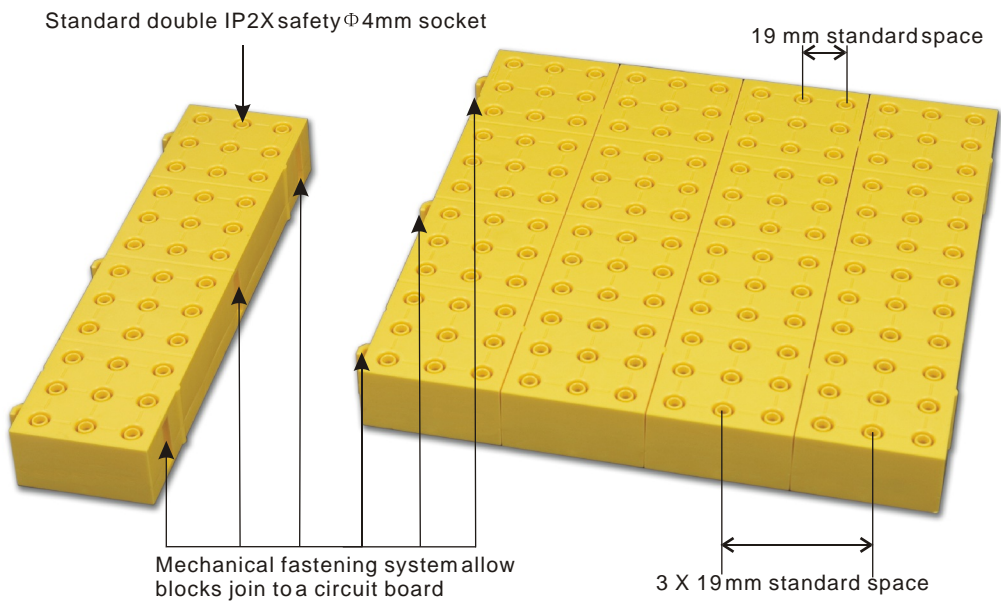
MSC MODULAR SAFETY CIRCUIT SYSTEM

WITH:
SAFETY CIRCUIT BOARD-MSC1
SAFETY VISIBLE COMPONENT MODULE-MSC2
SAFETY SHUNT & LEADS-MSC3

Features
 .Safety and easy to create your circuit quickly
 .Over 60 preset modules and custom made module is available
 .Standard double IP2X safety Φ 4mm socket connection



SAFETY CIRCUIT BOARD-MSC1



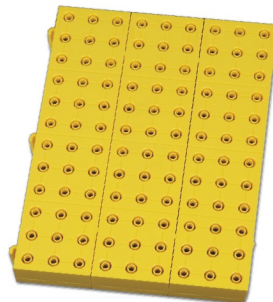
Model	Block	Unit	Socket
MSC1.1	1	4	36
MSC1.2	2	8	72
MSC1.3	3	12	108
MSC1.4	4	16	144



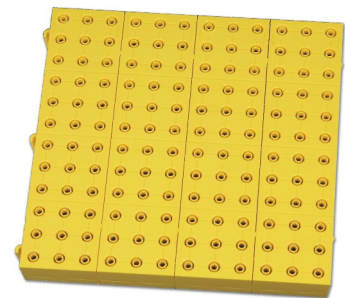
MSC1.1



MSC1.2



MSC1.3

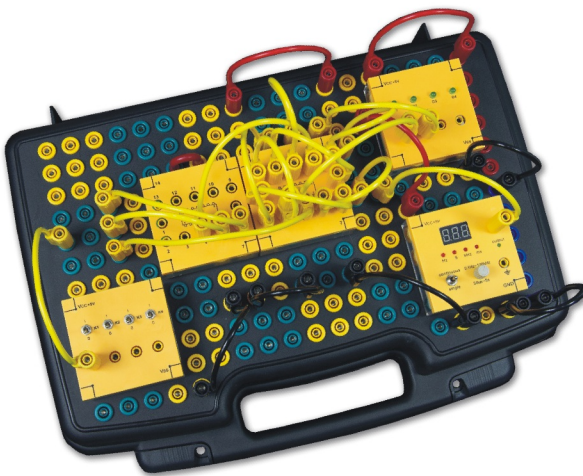


MSC1.4

● MODULAR SAFETY CIRCUIT SYSTEM

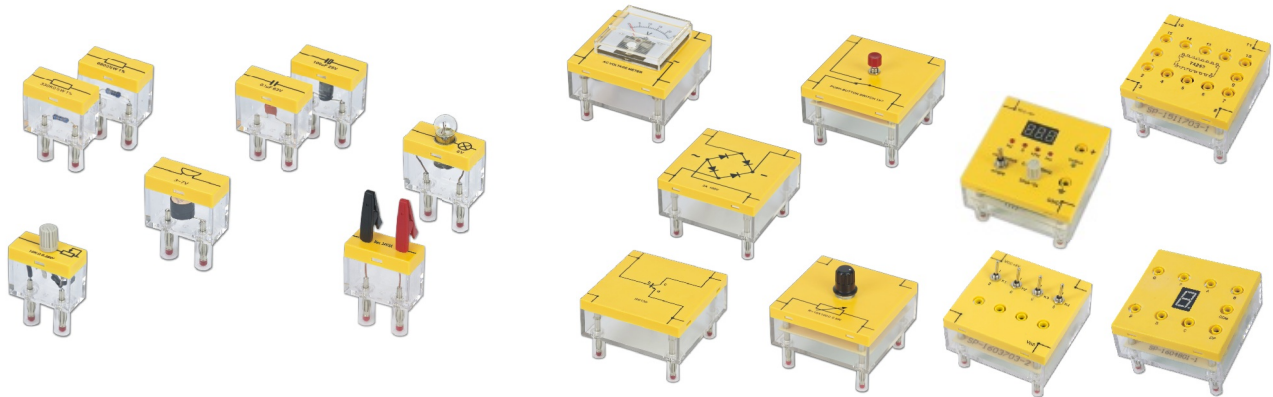


MSC1.9



Carry your lab everywhere

SAFETY VISIBLE COMPONENT MODULE-MSC2



MSC2.2 Series preset modules

Model	Specification
MSC2.2.001	Resistor 100Ω, 2W, 1%
MSC2.2.002	Resistor 100Ω, 1/2W, 1%
MSC2.2.003	Resistor 220Ω, 1/2W, 1%
MSC2.2.004	Resistor 470Ω, 1/2W, 1%
MSC2.2.005	Resistor 500Ω, 1/2W, 1%
MSC2.2.006	Resistor 680Ω, 1/2W, 1%
MSC2.2.007	Resistor 1kΩ, 1/2W, 1%
MSC2.2.008	Resistor 2.2kΩ, 1/2W, 1%
MSC2.2.009	Resistor 3.3kΩ, 1/2W, 1%
MSC2.2.010	Resistor 4.7kΩ, 1/2W, 1%
MSC2.2.011	Resistor 10kΩ, 1/2W, 1%
MSC2.2.012	Resistor 330kΩ, 1/2W, 1%

Model	Specification
MSC2.2.081	PTC 150Ω, 6W
MSC2.2.082	NTC 33Ω, 1W
MSC2.2.083	LDR 10MΩ ~8kΩ

Model	Specification
MSC2.2.101	E10 base bulb 6V
MSC2.2.102	Push-button switch 1x1
MSC2.2.103	Toggle switch 1x1
MSC2.2.104	Universal stand
MSC2.2.105	Buzzer 3~7V
MSC2.2.106	5V power supply

Model	Specification
MSC2.2.031	Capacitor 0.01uF, 250V
MSC2.2.032	Capacitor 0.1uF, 63V
MSC2.2.033	Capacitor 1uF, 25V
MSC2.2.034	Capacitor 2.2uF, 25V
MSC2.2.035	Capacitor 10uF, 25V
MSC2.2.036	Capacitor 47uF, 25V
MSC2.2.037	Capacitor 100uF, 25V
MSC2.2.038	Capacitor 1000uF, 25V

SC2.4 Series preset modules

Model	Specification
MSC2.4.002	500Ω, 0.5W
MSC2.4.003	1kΩ, 0.5W
MSC2.4.004	10kΩ, 0.5W
MSC2.4.005	1MΩ, 0.5W
MSC2.4.006	5kΩ, 3W

Model	Specification
MSC2.2.051	VR 500Ω, 0.25W
MSC2.2.052	VR 10kΩ, 0.25W

Model	Specification
MSC2.4.021	Decade 10x100Ω, 0.5W
MSC2.4.022	Decade 10x1kΩ, 0.5W

Model	Specification
MSC2.2.061	ZD6.2V
MSC2.2.062	ZD8.2V
MSC2.2.063	Diode 1N4007
MSC2.2.064	Diode 1N4148
MSC2.2.067	Red LED
MSC2.2.068	Green LED

Model	Specification
MSC2.4.031	Transistor BC108
MSC2.4.032	Transistor BC177
MSC2.4.033	Transistor BD135
MSC2.4.034	Transistor D133Y

Model	Specification
MSC2.4.041	Thyristor

Model	Specification
MSC2.2.071	1mH, 100mA
MSC2.2.072	10mH, 100mA
MSC2.2.073	50mH, 50mA

Model	Specification
MSC2.4.049	Diode bridge 2A, 100V

Model	Specification
MSC2.4.051	DC voltage meter 30V,2.5%
MSC2.4.052	DC current meter 1A,2.5%
MSC2.4.053	AC voltage meter 30V,2.5%
MSC2.4.054	AC current meter 1A,2.5%

Model	Specification
MSC2.4.105	DC power supply Input:12V Output: +5V/1A,+9V/1A
MSC2.2.106	5V DC power supply Input:5V (micro USB interface) Output:5V

Model	Specification
MSC2.4.101	Push-button switch 1x2
MSC2.4.102	Toggle switch 1x2
MSC2.4.103	Relay 12V
MSC2.4.104	DC motor 6V

SC2.7 Series preset modules

Model	Specification
MSC2.7.001	4-bit data switches
MSC2.7.002	4-bit led level display
MSC2.7.003	pulse generator 0.1Hz~100kHz
MSC2.7.004	7 seg led display

SC2.8 Series preset modules

Model	Specification
MSC2.8.001	7400 quad 2-input nand gates
MSC2.8.002	7402 quad 2-input nor gates
MSC2.8.003	7404 hex inverting gates
MSC2.8.004	7408 quad 2-input and gate
MSC2.8.005	7432 quad 2-input or gates
MSC2.8.006	7420 dual 4-input nand gates
MSC2.8.007	hd14002 dual 4-input nor gates
MSC2.8.008	7486 quad 2-input exclusive or gates
MSC2.8.009	74123 dual retriggerable monostable
MSC2.8.010	cd4077 quad 2-input exclusive nor gates
MSC2.8.011	7476 dual j-k flip-flop
MSC2.8.012	mc14027 dual j-k master/slave flip-flop
MSC2.8.013	74190 4-bit synchronous up/down binary counters
MSC2.8.014	74283 4-bit binary adder carry
MSC2.8.015	74194 4-bit bi-dir shift register
MSC2.8.016	74125 octal 3-state buffer
MSC2.8.017	74253 dual 4-ch 3-state multiplexers
MSC2.8.018	744511 bcd-7 seg driver/decoder

SAFETY SHUNT & LEADS-MSC3

Safety shunt MSC3.1

Standard double IP2X safety Φ 4mm plug and 19mm plugspace



MSC3.1

Safety leads MSC3.25

Standard double IP2X safety Φ 4mm plug
Length: 250mm



MSC UNIVERSAL BOX FOR CUSTOM CIRCUIT

NEW

Boxes without element for your own component or circuit creating

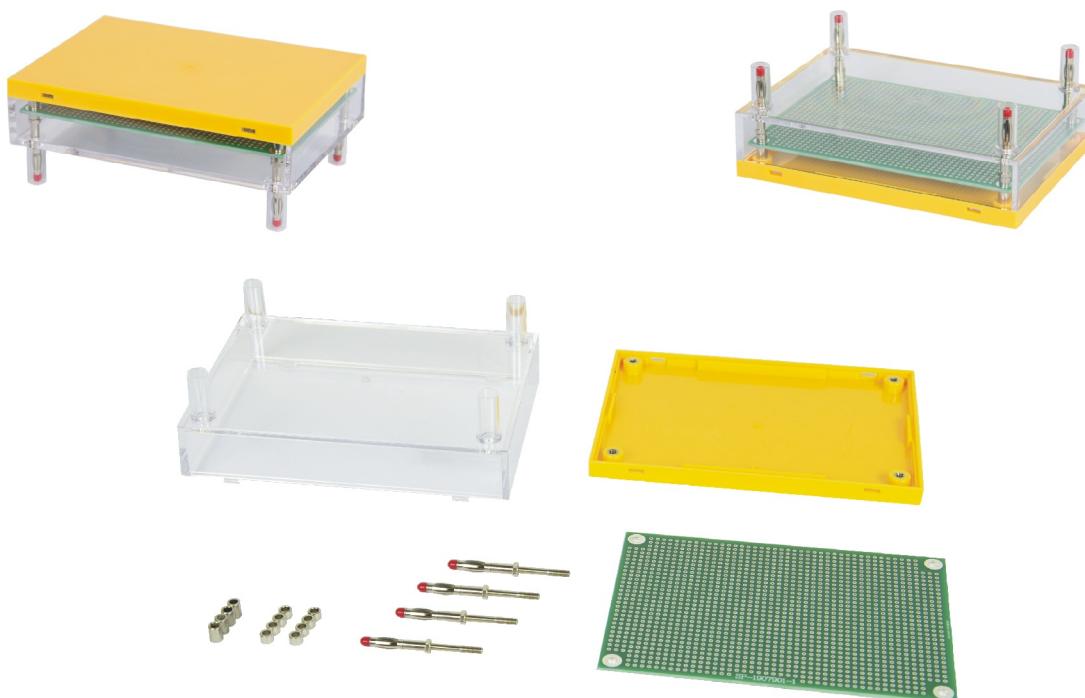
MSC 2.2.000 Dimensions (W×H×D): 38×50.5×19



MSC 2.4.000 Dimensions (W×H×D): 76×50.5×76

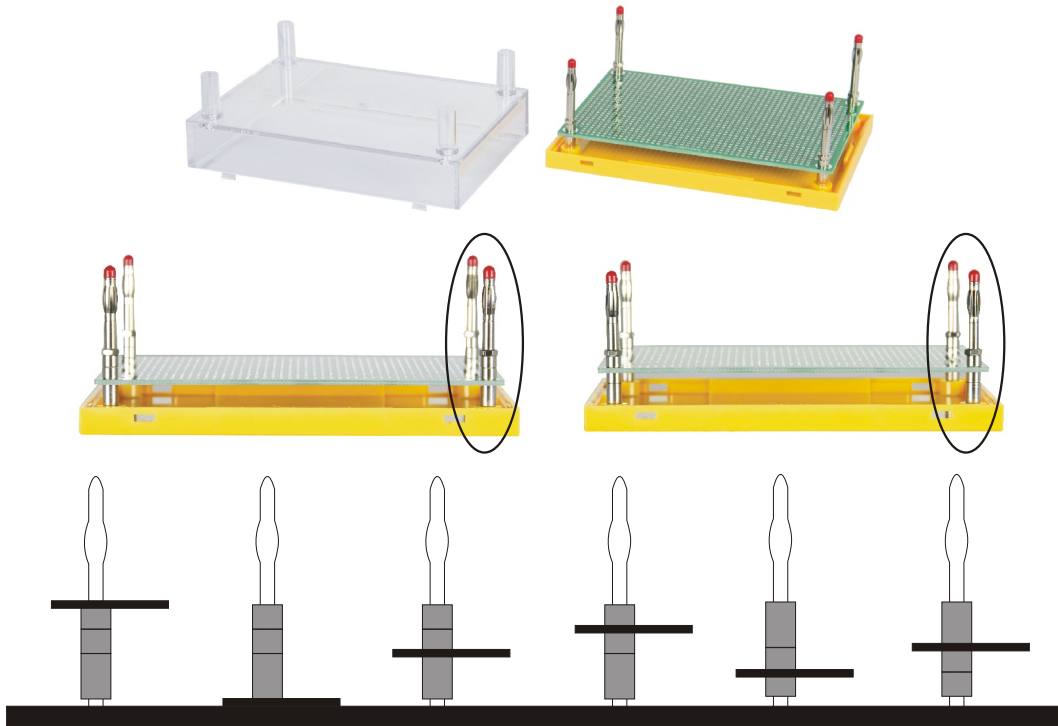


MSC 2.6.000 Dimensions (W×H×D): 133×50.5×95



● MODULAR SAFETY CIRCUIT SYSTEM

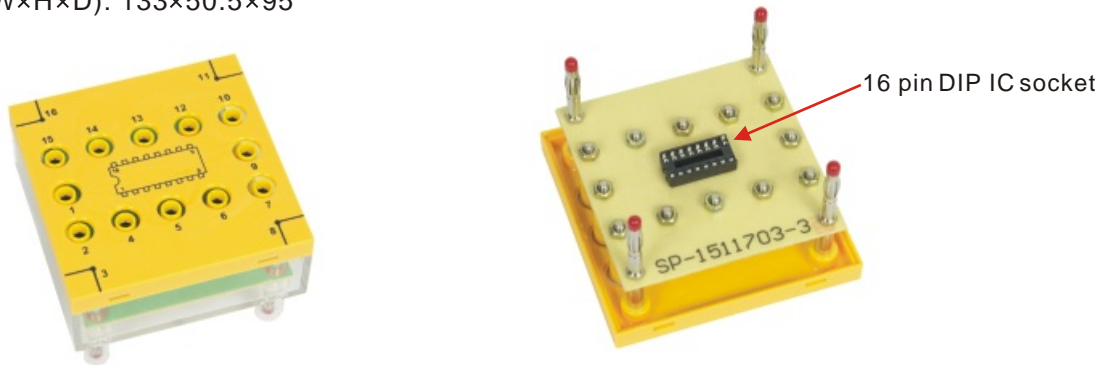
Cylinder adapter to match component height for MSC 2.4.000 and MSC 2.6.000



6 kinds of height position for PCB

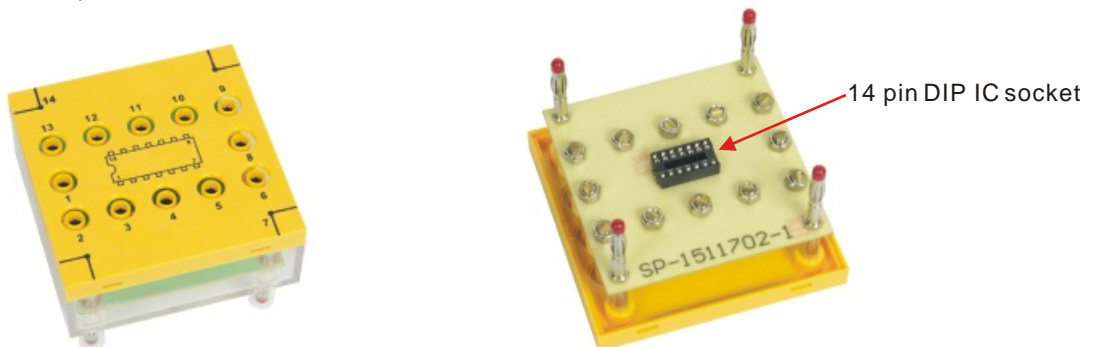
MSC 2.8.000A 16 pins DIY DIP IC socket

Dimensions (W×H×D): 133×50.5×95



MSC 2.8.000A 14 pins DIY DIP IC socket

Dimensions (W×H×D): 133×50.5×95



MSC DEMONSTRATION TRAINING SET MSC-01

SET CONTAIN

1. Safety circuit board MSC1

MSC1.1 6pcs

2. Safety visible component module MSC2

MSC2.2.006	1pc	Resistor 680 Ω , 1/2W, 1%
MSC2.2.007	1pc	Resistor 1k Ω , 1/2W, 1%
MSC2.2.033	1pc	Capacitor 1uF, 25V
MSC2.4.004	1pc	Potentiometer 10k Ω , 0.5W
MSC2.4.031	1pc	Transistor BC108
MSC2.4.049	1pc	Diode bridge 2A, 100V
MSC2.2.101	1pc	E10 base bulb 6V
MSC2.2.102	1pc	Push-button switch 1x1
MSC2.2.103	1pc	Toggle switch 1x1
MSC2.2.104	1pc	Universal stand
MSC2.2.105	1pc	Buzzer 3~7V
MSC2.4.102	1pc	Toggle switch 1x2
MSC2.4.104	1pc	DC motor 6V
MSC2.4.000	1pc	Universal box for custom circuit

3. Safety leads MSC3

MSC3.5R 3pc

MSC3.5K 3pc

MSC3.1 6pc

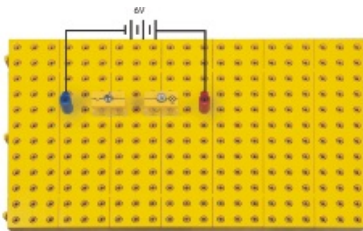
4. Plastic case

TPC005 1pc

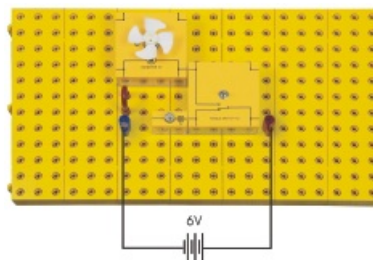


EXPERIMENT CONTAIN

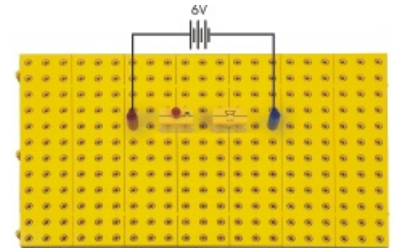
Single lamp control



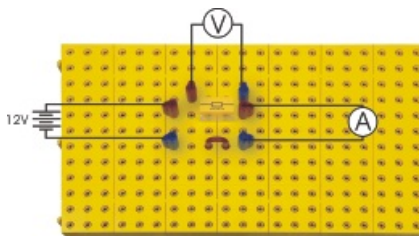
Lamp and fan select



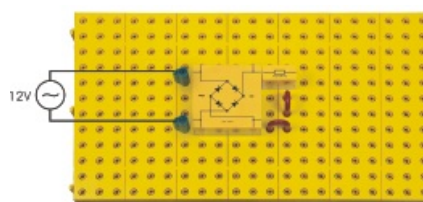
Buzzer control



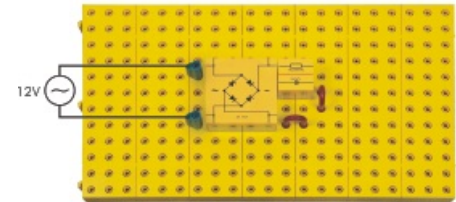
Ohm's law



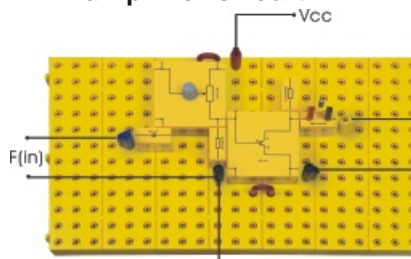
Full-wave rectifier



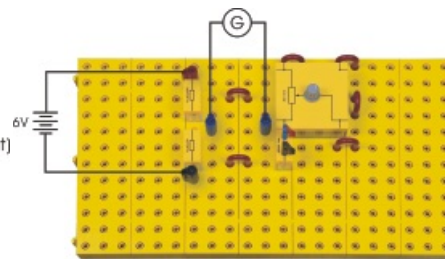
Rectify and filter



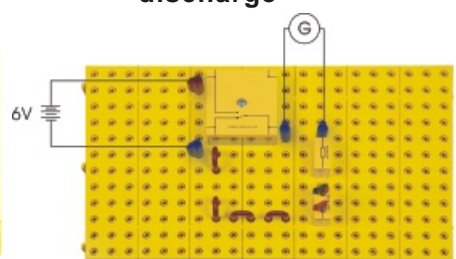
Basic transistor amplifier circuit



Bridge



Capacitor charge and discharge



MSC BASIC LOGIC GATE TRAINING SET MSC-02

SET CONTAIN

1. Safety circuit board MSC1

MSC1.1 6pcs

2. Safety visible component module MSC2

MSC2.8.001	1pc	Quad 2-input NAND gates 7400
MSC2.8.002	1pc	Quad 2-input NOR gates 7402
MSC2.8.003	1pc	Quad NOT gates 7404
MSC2.8.004	1pc	Quad AND gates 7408
MSC2.8.005	1pc	Quad OR gates 7432
MSC2.8.008	1pc	Quad 2-input EXCLUSIVE OR gates 7486
MSC2.8.010	1pc	Quad EXCLUSIVE NOR gates CD4077
MSC2.7.001	1pc	4-digit data switch
MSC2.7.002	1pc	4-digit level display

3. Safety leads MSC3

MSC3.25R	1pc
MSC3.25K	1pc
MSC3.25B	2pc
MSC3.25G	2pc
MSC3.25Y	2pc

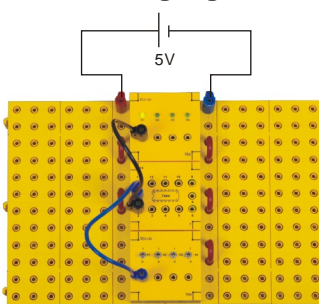
4. Plastic case

TPC005 1pc

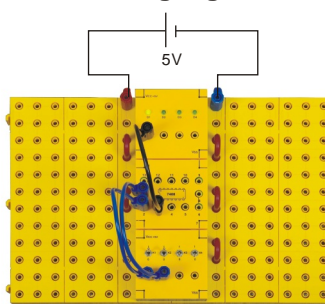


EXPERIMENT CONTAIN

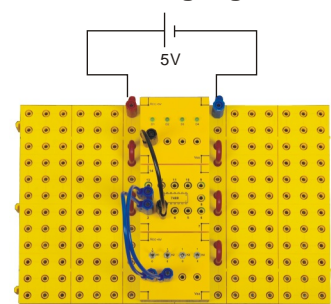
NOT logic gate



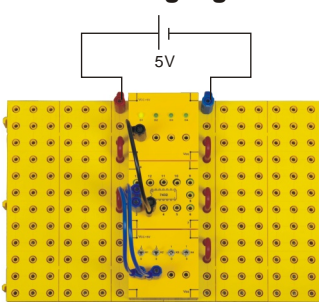
AND logic gate



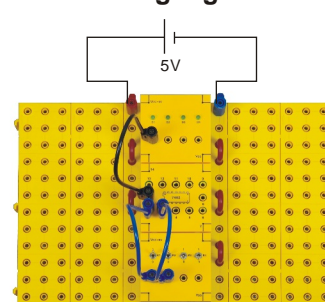
NAND logic gate



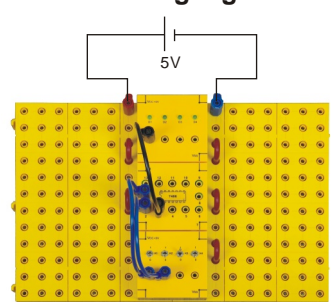
OR logic gate



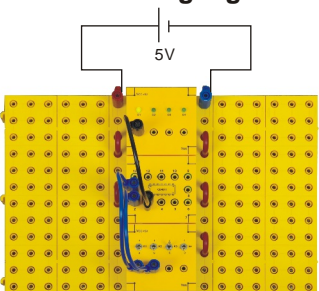
NOR logic gate



XOR logic gate



XNOR logic gate



MSC ADVANCED LOGIC GATE TRAINING SET MSC-03

SET CONTAIN

1. Safety circuit board MSC1

MSC1.1 6pcs

2. Safety visible component module MSC2

Resistor 5.6kΩ, 1/2W, 1%	2pcs
Resistor 1kΩ, 1/2W, 1%	2pcs
Resistor 27kΩ, 1/2W, 1%	2pcs
Resistor 820Ω, 1/2W, 1%	2pcs
Capacitor 0.01μF, 250V	2pcs
Capacitor 0.033μF, 250V	2pcs
Capacitor 0.022μF, 250V	1pc
Diode 1N4007	1pc
Transistor BC108	2pcs
Toggle switch 1 × 2	1pc
4-digit data switch	2pcs
4-digit level display	2pcs
Pulse generator 0.1Hz~10kHz	1pc

Quad 2-input NAND gates 7400	1pc
Quad 2-input NOR gates 7402	1pc
Hex NOT gates 7404	1pc
Quad 2-input AND gates 7408	1pc
Quad 2-input OR gates 7432	1pc
Quad 2-input EXCLUSIVE OR gates 7486	1pc
Quad 2-input EXCLUSIVE NOR gates CD4077	1pc
Dual AND-OR-INVERT gates 7451	1pc
Hex NOT gates Open-collector 7405	1pc
Dual 4-input NAND gates 7420	2pcs
Triple 3-input NAND gates 7410	1pc
4-bit Binary Adder Carry 7483	1pc
AND-gated J-K flip-flop 7472	4pcs
Decade/Binary counter 7490	4pcs
Dual J-K Flip-Flop 7476	3pcs
5-bit S-R Flip-Flop 7496	1pc
Quad 2-input NAND gates Open-collector 7403	1pc
Hex Schmitt trigger inverter 7414	1pc

3. Safety leads MSC3

MSC3.25R	4pcs
MSC3.25N	4pcs
MSC3.25B	6pcs
MSC3.25G	6pcs
MSC3.25Y	6pcs
MSC3.1	6pcs

4. Plastic case

TPC006	1pc
--------	-----



MSC-03

EXPERIMENT CONTAIN

I Basic Logic Function

- 1 OR logic gate
- 2 INVERT logic gate
- 3 OR + INVERT = NOR logic gate
- 4 NOR logic gate
- 5 2-input NAND logic gate
- 6 4-input NAND logic gate
- 7 AND - OR - INVERT logic gate

II Boolean Algebra

- 1 $A = \overline{\overline{A}}$
- 2 $A + 1 = 1, A + 0 = A, A + A = A, A + \overline{A} = 1$
- 3 $A \cdot 1 = A, A \cdot 0 = 0, A \cdot A = A, A \cdot \overline{A} = 0$
- 4 Logic equation

III De Morgan's Theorem

$$\overline{A+B} = \overline{A} \cdot \overline{B}, \overline{A \cdot B} = \overline{A} + \overline{B}, \overline{\overline{\overline{A+B}}} = \overline{\overline{A+B}} = A+B, \overline{\overline{\overline{A \cdot B}}} = \overline{\overline{A \cdot B}} = A \cdot B \cdot C,$$

$$\overline{\overline{\overline{A \cdot B \cdot C}}} = \overline{\overline{A \cdot B \cdot C}} = A+B+C, A \cdot C + B \cdot C = (A+B) \cdot C$$

IV Exclusive-OR and Its Applications

- 1 Exclusive-OR
- 2 Half-Adder, Half-Subtractor
- 3 Binary Comparator
- 4 Parity Generator

V Adder and Subtractor

- 1 Half-Adder, Half-Subtractor
- 2 SUM in Full-Adder and DIFFERENCE in Full-Subtractor
- 3 Co for X+Y+Ci
- 4 Full-Adder with Half-Adders
- 5 2-Bit Parallel Binary Adder
- 6 4-Bit Binary Full-Adder/2's-complement 4-Bit Binary Full-Subtractor

VI Bistable or Flip-Flop

- 1 R-S Flip-Flop with NAND Gates
- 2 Gated R-S Flip-Flop
- 3 D Flip-Flop
- 4 AND-Gated J-K Master-Slave Flip-Flop

VII Binary Counters

- 1 Binary ripple counter
- 2 Synchronous counter

VIII Divide-by-N Counters and Decade Counters

- 1 Modulus 3 Counter
- 2 Modulus 6 Counter
- 3 Decade Counter 2421
- 4 Decade Counter 8421
- 5 IC Decade Counter
- 6 IC Divide-by-10 Counter

IX Shift Registers and Ring Counter

- 1 Shift Register
- 2 IC Shift Register
- 3 Quinary ring counter
- 4 Twisted-ring or Johnson Counter

X Pulse Forming and Shaping/ Schmitt Trigger

- 1 Transistor Astable
- 2 IC Astable
- 3 Pulse Stretchers
- 4 Schmitt Trigger

Objects

The training systems of electronic circuits are designed for educational practice. All components are separated as in transparent plastic boxes with magnetic stand on a grid panel or without magnetic on a rubber matrix. Circuit assemble is made by leads plug. The training systems are used in some certain experiments, it can be completed according to the written experiment manual and also you can design other more experiments with yourself.

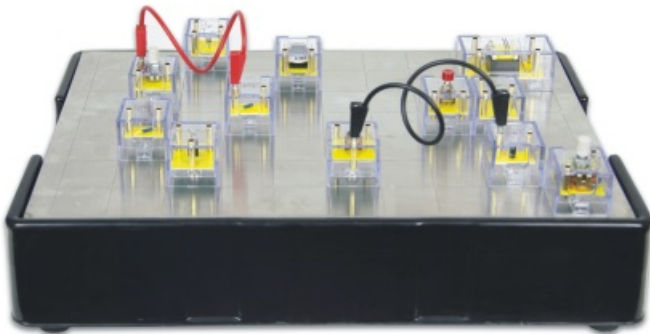
BASIC ELECTRONIC CIRCUIT TRAINING SYSTEM F1-1

Features

The training system is used in the analog electronic circuits, it can be completed according to the F1-1 experiment manual. Totally 33 recommend experiments are contained in this system with the corresponding components and more experiments can be designed to do by yourself.

System contain:

- | | | | |
|------------------------|--------|----------------------|-------|
| 1. Grid panel and tray | 1 pcs | 4. Experiment manual | 2 pcs |
| 2. Components | 49 pcs | | |
| 3. Leads | 40 pcs | | |



EXPERIMENTS CONTENT

- | | |
|---|--|
| 1: Series resistors circuit | 19: Common collector transistor amplifier circuit |
| 2: Parallel resistors circuit | 20: Constant DC voltage control circuit with transistor |
| 3: Compound resistors circuit | 21: Capacitors in series and parallel circuit |
| 4: Ohm's law $I = F(V)$ | 22: Characteristics of PTC resistor |
| 5: Ohm's law $I = F(R)$ | 23: Characteristics of NTC resistor |
| 6: Kirchhoff's Laws on voltage | 24: Characteristics of the transformer on load and no load |
| 7: Kirchhoff's Laws on current | 25: Half-wave rectifier |
| 8: Superposition theorem | 26: Full-wave rectifier |
| 9: Thevenin's theorem | 27: The function of the relay |
| 10: Norton's theorem | 28: Inductors in series and parallel circuit |
| 11: Voltage divider circuit | 29: Magnetic induction circuit transformer |
| 12: Wheatstone bridge circuit | 30: Characteristics of diode in DC circuit |
| 13: R, C series circuit in AC circuit | 31: Characteristics of diode in AC circuit |
| 14: R, L series circuit in AC circuit | 32: Rectifier and filter current circuit |
| 15: R, L, C series circuit in AC circuit | 33: Characteristics of Zener diode |
| 16: Characteristics of transistor | |
| 17: Common base transistor amplifier circuit | |
| 18: Common emitter transistor amplifier circuit | |

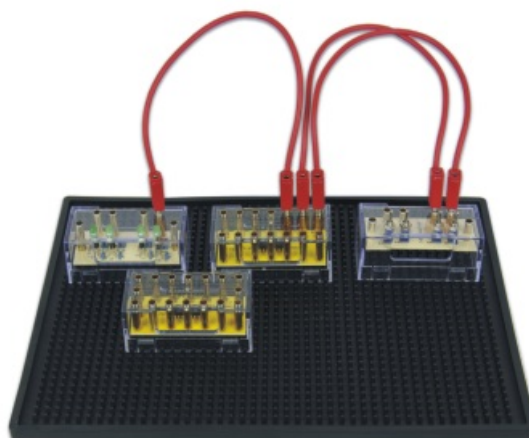
BASIC LOGIC GATE TRAINING SYSTEM F1-2

Features

The training system is used in the digital electronic circuits, it can be completed according to the F1-2 experiment manual. Totally 16 recommend basic logic gate experiments are contained in this system with the corresponding components and more experiments can be designed to do by yourself.

System contain:

- | | |
|----------------------------------|--------|
| 1. Rubber matrix and plastic box | 1 pcs |
| 2. Components | 15 pcs |
| 3. Leads | 20 pcs |
| 4. Experiment manual | 1 pcs |



EXPERIMENTS CONTENT

I Basic Logic Function

- 1 OR logic gate
- 2 INVERT logic gate
- 3 OR + INVERT = NOR logic gate
- 4 NOR logic gate
- 5 2-input NAND logic gate
- 6 4-input NAND logic gate
- 7 AND - OR - INVERT logic gate

II Boolean Algebra

- 1 $A = \overline{\overline{A}}$
- 2 $A + 1 = 1, A + 0 = A, A + A = A, A + \overline{A} = 1$
- 3 $A \cdot 1 = A, A \cdot 0 = 0, A \cdot A = A, A \cdot \overline{A} = 0$
- 4 Logic equation

III De Morgan's Theorem

$$\overline{A+B} = \overline{A} \cdot \overline{B}, \overline{A \cdot B} = \overline{A} + \overline{B}, \overline{\overline{\overline{A+B+C}}} = \overline{A} \cdot \overline{B} \cdot \overline{C},$$

$$\overline{\overline{\overline{A \cdot B \cdot C}}} = \overline{A+B+C}, \overline{A \cdot C + B \cdot C} = (\overline{A+B}) \cdot C$$

IV Exclusive-OR and Its Applications

- 1 Exclusive-OR
- 2 Half-Adder, Half-Subtractor
- 3 Binary Comparator
- 4 Parity Generator

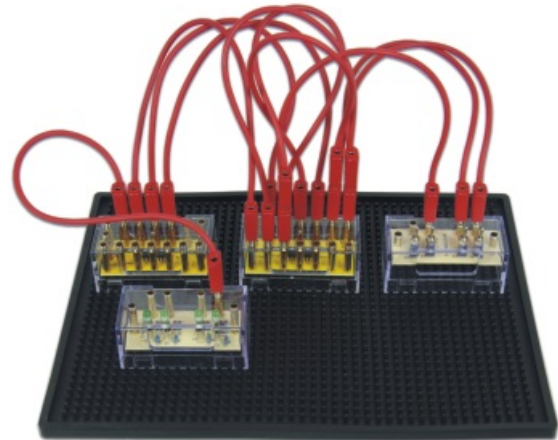
BASIC LOGIC CIRCUIT TRAINING SYSTEM F1-3

Features

The training system is used in the digital electronic circuits, it can be completed according to the F1-3 experiment manual. Totally 26 recommend basic logic circuit experiments are contained in this system with the corresponding components and more experiments can be designed to do by yourself.

System contain:

- | | |
|----------------------------------|--------|
| 1. Rubber matrix and plastic box | 1 pcs |
| 2. Components | 39 pcs |
| 3. Leads | 20 pcs |
| 4. Experiment manual | 1 pcs |



EXPERIMENTS CONTENT

I Adder and Subtractor

- 1 Half-Adder, Half-Subtractor
- 2 SUM in Full-Adder and DIFFERENCE in Full-Subtractor
- 3 Co for $X+Y+C_i$
- 4 Full-Adder with Half-Adders
- 5 2-Bit Parallel Binary Adder
- 6 4-Bit Binary Full-Adder/2's-complement 4-Bit Binary Full-Subtractor

II Bistable or Flip-Flop

- 1 R-S Flip-Flop with NAND Gates
- 2 Gated R-S Flip-Flop
- 3 D Flip-Flop
- 4 AND-Gated J-K Master-Slave Flip-Flop

III Binary Counters

- 1 Binary ripple counter
- 2 Synchronous counter

IV Divide-by-N Counters and Decade Counters

- 1 Modulus 3 Counter
- 2 Modulus 6 Counter
- 3 Decade Counter 2421
- 4 Decade Counter 8421
- 5 IC Decade Counter
- 6 IC Divide-by-10 Counter

V Shift Registers and Ring Counter

- 1 Shift Register
- 2 IC Shift Register
- 3 Quinary ring counter
- 4 Twisted-ring or Johnson Counter

VI Pulse Forming and Shaping/The Schmitt Trigger

- 1 Transistor Astable
- 2 IC Astable
- 3 Pulse Stretcher
- 4 Schmitt Trigger

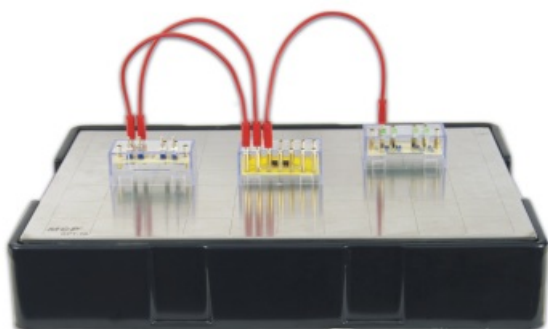
CLASSICAL DIGITAL CIRCUIT TRAINING SYSTEM F1-4 **NEW**

Features

The training system is used in the digital electronic circuits, it can be completed according to the F1-4 experiment manual. Totally 57 recommend classical digital circuit experiments are contained in this system with the corresponding components and more experiments can be designed to do by yourself

System contain:

1. Rubber matrix and plastic box	1 pcs	3. Leads	30 pcs
2. Components	77 pcs	4. Experiment manual	1 pcs



EXPERIMENTS CONTENT

I Basic Logic Function

- 1 OR logic gate
- 2 INVERT logic gate
- 3 OR + INVERT = NOR logic gate
- 4 NOR logic gate
- 5 2-input NAND logic gate
- 6 4-input NAND logic gate
- 7 AND - OR - INVERT logic gate

II Boolean Algebra

- 1 $A = \overline{\overline{A}}$
- 2 $A + 1 = 1, A + 0 = A, A + A = A, A + \overline{A} = 1$
- 3 $A \cdot 1 = A, A \cdot 0 = 0, A \cdot A = A, A \cdot \overline{A} = 0$
- 4 Logic equation

III De Morgan's Theorem

$$\overline{A+B} = \overline{A} \cdot \overline{B}, \overline{A \cdot B} = \overline{A} + \overline{B}, \overline{\overline{A+B+C}} = A+B+C, \overline{\overline{A \cdot B \cdot C}} = A \cdot B \cdot C$$

IV Exclusive-OR and Its Applications

- 1 Exclusive-OR
- 2 Half-Adder, Half-Subtractor
- 3 Binary Comparator
- 4 Parity Generator

V Adder and Subtractor

- 1 Half-Adder, Half-Subtractor
- 2 SUM in Full-Adder and DIFFERENCE in Full-Subtractor
- 3 Co for $X+Y+Ci$
- 4 Full-Adder with Half-Adders
- 5 2-Bit Parallel Binary Adder
- 6 4-Bit Binary Full-Adder/2's-complement 4-Bit Binary Full-Subtractor

VI Bistable or Flip-Flop

- 1 R-S Flip-Flop with NAND Gates
- 2 Gated R-S Flip-Flop
- 3 D Flip-Flop
- 4 AND-Gated J-K Master-Slave Flip-Flop

EXPERIMENTS CONTENT

VII Binary Counters

- 1 Binary ripple counter
- 2 Synchronous counter

VIII Divide-by-N Counters and Decade Counters

- 1 Modulus 3 Counter
- 2 Modulus 6 Counter
- 3 Decade Counter 2421
- 4 Decade Counter 8421
- 5 IC Decade Counter
- 6 IC Divide-by-10 Counter

IX Shift Registers and Ring Counter

- 1 Shift Register
- 2 IC Shift Register
- 3 Quinary ring counter
- 4 Twisted-ring or Johnson Counter

X Pulse Forming and Shaping/The Schmitt Trigger

- 1 Transistor Astable
- 2 IC Astable
- 3 Pulse Stretchers
- 4 Schmitt Trigger

XI IC Timer-74122, 74121 and 555

- 1 74122
- 2 74121
- 3 555 Timer

XII Decoding and Encoding

- 1 Decoding
- 2 Encoding-decimal to excess 3
- 3 BCD counter with seven-segment LED display

XIII Random-Access Memories (RAM)

- 1 2-bit random-access memory
- 2 64-bit IC RAM 7489

XIV Operational Amplifier

- 1 Op-Amp as an analog voltage multiplier
- 2 Op-Amp as a summer-multiplier
- 3 Op-Amp as a voltage comparator
- 4 Integrator
- 5 Variable PW generator

XV D/A and A/D Conversion

- 1 D/A conversion
- 2 A/D conversion

F1 series custom model list:

F1-1000 series resistor models



F1-4000 series capacitor models



F1-7000 series switch and relay



F1-2000 series potentiometer models



F1-5000 series zener and diode models



F1-8000 series transistor models



F1-3000 series decade resistor models



F1-6000 series inductor models



F1-9000 series transformer models



DEMONSTRATION TRANSPARENT COMPONENTS

F3 SERIES



Features

- Light and magnetic fixture
- Visible components
- 4mm safety socket connection
- Customization allows
- Dimensions (W×H×D):100×68×40mm

F3-001
Resistor

4.7 Ω, 12 Ω, 39 Ω, 2W

F3-002
Capacitor
470pF, 4700pF
47000pF, 63V

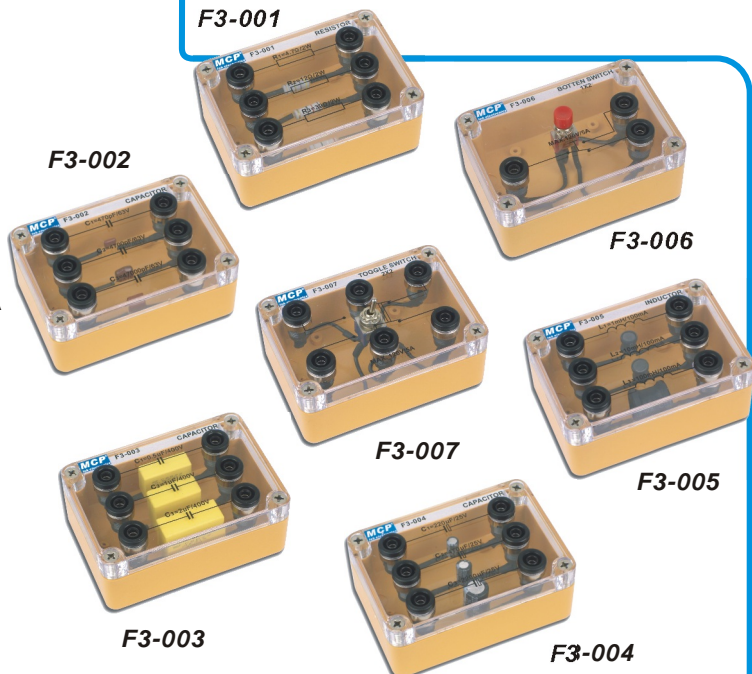
F3-003
Capacitor
0.5 μ F, 1 μ F, 2 μ F, 400V

F3-004
Capacitor
220 μ F, 470 μ F
2200 μ F, 25V

F3-005
Inductor
1mH, 10mH
100mH, 100mA

F3-006
Push switch
1×2, 120V, 5A

F3-007
Toggle switch
2×2, 120V, 5A



F3-008

F3-009

F3-014

F3-010

F3-008
Fuse

6×20, 250V, 3A

F3-009
Crocodile clip

24V, 3A

F3-013

F3-012

F3-011

F3-010
Spring clip

24V, 3A

F3-011
E10 bulb base

6V

F3-012
B10 bulb base

6V

F3-013
B15 bulb base

24V

F3-014
DC Motor

3V, 200mA

DEMONSTRATION TRANSPARENT COMPONENTS



F3-015



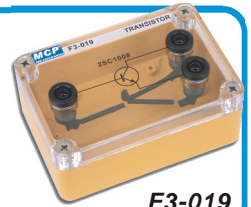
F3-016



F3-017



F3-018



F3-019

F3-015
Buzzer

3~7V

F3-16
Speaker

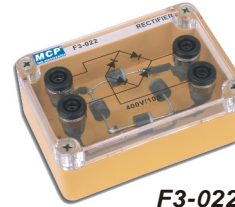
8Ω, 0.3W



F3-020



F3-021



F3-022



F3-023

F3-017
Potentiometer

1KΩ, 0.5W

F3-018
Diode

1N4004

F3-019 **F3-020**
Transistor Thyristor

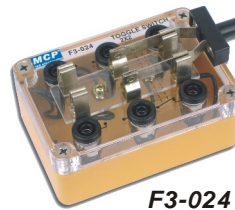
2SC1008 97A6

F3-021 **F3-022**
LED Rectifier

6V 400V, 10A

F3-023
Transformer

220V, 6V-0-6V, 1A



F3-024



F3-027

F3-024
Toggle switch

2X2



F3-025



F3-028

F3-025
Toggle switch

1X2

F3-026
DC current meter

0~5A
Accuracy: 2.5%



F3-026



F3-029

F3-027
DC voltage meter

0~30V
Accuracy: 2.5%

F3-028
AC current meter

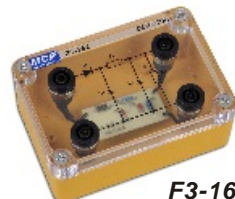
0~5A
Accuracy: 2.5%

F3-029
AC voltage meter

0~30V
Accuracy: 2.5%



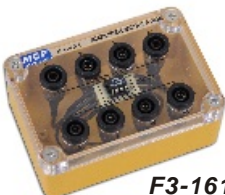
F3-160



F3-162

F3-161
Amplifier modulation

Analog multiplier



F3-161

F3-160
Operational amplifier

Amplifier TL081

F3-162
Detector

The circuit for demodulation

DEMONSTRATION TRANSPARENT COMPONENTS



F3-301



F3-302



F3-303



F3-304



F3-305



F3-306

Electromagnetism experiment boxes

*Non-magnetic fixture

F3-301
Circle Circuit

25 turns, $I_{Max}=1A$

F3-305
Straight Circuit

7 turns, $I_{Max}=3A$

F3-302
Solenoid Circuit

10 turns, $I_{Max}=3A$

F3-306
The Oersted Needle

$I_{Max}=1A$

F3-303
Straight ladder

$I_{Max}=3A$

F3-304
Head bow

$I_{Max}=3A$



**F3 DEMONSTRATION TRANSPARENT COMPONENTS
WITH TBF-100 DEMONSTRATION FRAME**

F3-717 SOLAR POWER GENERATION

Objects

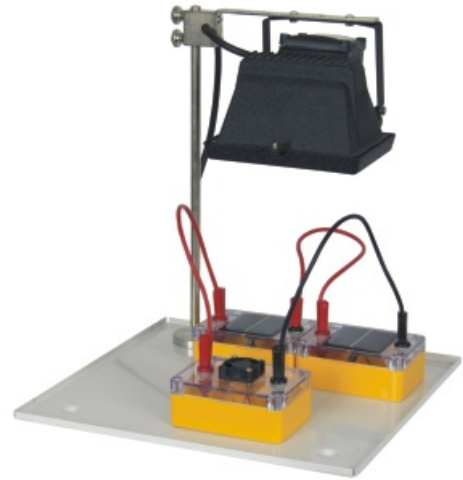
Solar panel, LED lamp and DC fan consist a solar power system

Principles

Solar panel generates the power by illumination and as a source supplies to lamp and fan. The solar panel can be connected in parallel or series to get higher voltage or current.

SYSTEM CONTAIN

- 4 pcs solar panel 3V/150mA
- 3 pcs LED lamp 3V, 6V, 12V
- 3 pcs DC fan 3V, 6V, 12V
- 1 pcs light source 220V/150W
- 1 pcs magnetic base
- 5 pcs cables



F3-718 WIND POWER GENERATION

Objects

Wind power generator, LED lamp and DC fan consist a wind power system

Principles

Wind power generator which derived by the power of a fan (wind simulation) is a source supply to lamp and fan.

SYSTEM CONTAIN

- 1 pcs wind power generator
- 1 pcs LED lamp/DC fan 3V
- 1 pcs wind source 220V/50W
- 1 pcs magnetic base
- 2 pcs cables



TB SERIES

Feature

.The benches are designed for the use of training, developing services, calibration and assembling benches



TB 1000

TB 1000 Training bench

.Height:81.5cm
.Width: 157cm
.Depth: 90cm
.4 adjustable stands or 4 wheels



TB 1100

TB1100 Training bench + Top frame

.Training bench (TB1000)
.Top frame

TB1200



Feature

.The benches are designed for the use of training, developing services, calibration and assembling benches

TB1200

Training bench + instrument housing

1. Training bench (TB1000)
2. Instrument housing
 - . Oscilloscope: DQ6025 ×1
 - . DC power supply: M10-TP3003L ×1
 - . Function generator: SG1638 ×1
 - . RF generator: HG1500 ×1
 - . Digital multimeter: MT8145 ×1
 - . AC power supply: 0~250V, 6V, 12V, 24V
 - . Soldering station ×1
 - . AC outlet ×6
 - . Test leads holder: PTL2001



TB 1200

Brief technical data of installed instruments

- 2.1 Oscilloscope: DQ6025
 - Bandwidth: 25MHz
 - Sampling rate: 250MSa/s
 - Vertical sensitivity: 1mV/div~20V/div
 - Trigger mode: auto, normal, single
- 2.2 DC power supply: M10-TP3003L
 - Output voltage: 0~30V × 2
 - 5V fixed
 - Output current: 0~3A × 2
 - Max. 3A
 - Output mode: independent, series, parallel
- 2.3 Function generator: SG1638
 - Output frequency: 2MHz
 - Output amplitude: 20Vp-p
 - Output waveforms: sine, square, triangle and TTL
 - Output impedance: 50Ω
- 2.4 RF generator: HG1500
 - Output frequency: 100kHz~150MHz
 - INT. & EXT. modulation: AM, FM
 - Audio signal generator: 1kHz±10%
 - FM stereo signal generator: 88~108MHz
- 2.5 Digital multimeter: MT8145
 - DC voltage: 80mV, 800mV, 8V, 80V, 800V, 1000V
 - AC voltage: 80mV, 800mV, 8V, 80V, 750V
 - DC current: 80mA, 800mA, 8A, 20A
 - AC current: 80mA, 800mA, 8A, 20A
 - Resistance: 800Ω, 8kΩ, 80kΩ, 800kΩ, 8MΩ, 80MΩ
 - Capacitance: 1nF, 10nF, 100nF, 1μF, 10μF, 100μF
 - Frequency: 999099Hz~1000.0MHz
 - hFE: √

TB1400



Feature

.The benches are suitable for the use of training, developing, service, calibration and assembling with PC program

TB1400

Training bench + instrument housing
PC controllable with USB interface

- 1. Training bench (TB1000)
- 2. Instrument housing
 - . Oscilloscope: DQ6102E x1
 - . DC power supply: M5003 x1
 - . Digital multimeter: MT8145 x1
 - . DDS function generator: UPF1.5-20 x1
 - . Solering station x1
 - . AC outlet x8
 - . Test leads holder: PTL2001 x2



TB 1400

Brief technical data of installed instruments

2.1 Oscilloscope: DQ6102E

Bandwidth: 100MHz
 Sampling rate: 1GSa/s
 Channels: 2
 Vertical sensitivity: 1mV/div~20V/div
 Horizontal range: 2ns/div~50s/div
 Trigger mode: Auto, Normal, Single
 Math: +, -, x, /, FFT
 Panel interface: USB

2.2 DC power supply: M5003

Output voltage: 0~30V×2, 2.5V, 3.3V, 5V
 Output current: 0~3A×2, 3A
 Output mode: independent, series, parallel, store & recall
 Panel interface: USB

2.3 Digital multimeter: MT8145

DC voltage: 80mV, 800mV, 8V, 80V, 800V, 1000V
 AC voltage: 80mV, 800mV, 8V, 80V, 750V
 DC current: 80mA, 800mA, 8A, 20A
 AC current: 80mA, 800mA, 8A, 20A
 Resistance: 800Ω, 8kΩ, 80kΩ, 800kΩ, 8MΩ, 80MΩ
 Capacitance: 1nF, 10nF, 100nF, 1μF, 10μF, 100μF
 Frequency: 999099Hz~1000.0MHz
 hFE: ✓
 Panel interface: USB

2.4 DDS function generator: UPF1.5-20

Channels: A, B
 Output frequency: 1uHz~20MHz
 Output waveform: Sine, Square, Ramp, Pulse, Triangle, arbitrary
 Modulation: AM, FM, PM, ASK, FSK, PSK
 Panel interface: USB

TB1600



Feature

.The benches are suitable for the use of training, developing, service, calibration and DIY

TB1600

Training bench + instrument housing

- 1. Training bench (TB1000)
- 2. Instrument housing
 - . Oscilloscope: DQ6102E x1
 - . DC power supply: M10-TP3003L x1
 - . Digital multimeter: MT8145 x1
 - . LCR meter: BR4822 x1
 - . Transistor tester: TST294 x1
 - . AC power supply: x1
 - . Store house x1
 - . AC outlet x4
 - . Test leads holder: PTL2001 x2



TB 1600

Brief technical data of installed instruments

2.1 Oscilloscope: DQ6102E

Bandwidth: 100MHz
 Sampling rate: 1GSa/s
 Channels: 2
 Vertical sensitivity: 1mV/div~20V/div
 Horizontal range: 2ns/div~50s/div
 Trigger mode: Auto, Normal, Single
 Math: +, -, x, /, FFT

2.2 DC power supply: M10-TP3003L

Output voltage: 0~30V × 2, 5V fixed
 Output current: 0~3A × 2, Max. 3A
 Output mode: independent, series, parallel

2.3 Digital multimeter: MT8145

DC voltage: 80mV, 800mV, 8V, 80V, 800V, 1000V
 AC voltage: 80mV, 800mV, 8V, 80V, 750V
 DC current: 80mA, 800mA, 8A, 20A
 AC current: 80mA, 800mA, 8A, 20A
 Resistance: 800Ω, 8kΩ, 80kΩ, 800kΩ, 8MΩ, 80MΩ
 Capacitance: 1nF, 10nF, 100nF, 1μF, 10μF, 100μF
 Frequency: 999099Hz~1000.0MHz
 hFE:

2.4 LCR meter: BR4822

L: 0.01~9999H
 C: 0.5pF~200mF
 R: 0.1mΩ~19.99MΩ
 Q: 0.01~999
 D: 0.01%~999%
 Test frequency: 100Hz, 1kHz, 7.8kHz

2.5 Transistor tester: TST294

VBR range: 0~1000V, 0~200V
 VCE range: 0~6V
 hEF: 0~200, 0~2000
 ICEO: 0~2000uA
 78 & 79 voltage regulator: 78XX / 79XX

2.6 Store house

Inner dimension (WxHxD): 462 x 86 x 312mm

M21-1800



Feature

The benches provide a course on the operation and trouble shooting for electrical control circuits. It has unique training capabilities with a fault insertion system which is useful as a teaching aid in fault finding or troubleshooting the electrical control circuits

M21-1800

Training bench + device housing

1. Training bench (TB1000)

2. Device housing

- .Main MCB 3 phase 16A (miniature circuit breaker) x1
 - .Control MCB 1 phase 6A (miniature circuit breaker) x1
 - .ELCB 3phase (earth leakage circuit breaker) x1
 - .Control lamp to indicate "On" x3
 - .Magnetic contactor+auxiliary contacts (2NO+2NC) x3
 - .Push button switch, NO/NC x4
 - .Regulated cam switch, I-O-II x1
 - .Thermal overload relay 1-1.6A x2
 - .Time delay relay 0- 10 sec x1
 - .Push button switch for emergency off "Off" x1
 - .Illuminated power lamp x1
 - .Fault simulator switch x30
3. Test mater x1
4. Cable and test leads
- .Connection test leads x1 set
 - .Power cable x1



M21-1800

MULTI-PURPOSE WORKSTATION



Feature

This multi-purpose workstation is worked with TB-1000 series training bench (Page 92). With the various combination of the control units, you can make a customized workstation that meet your requirement. Our control units can also be customized.



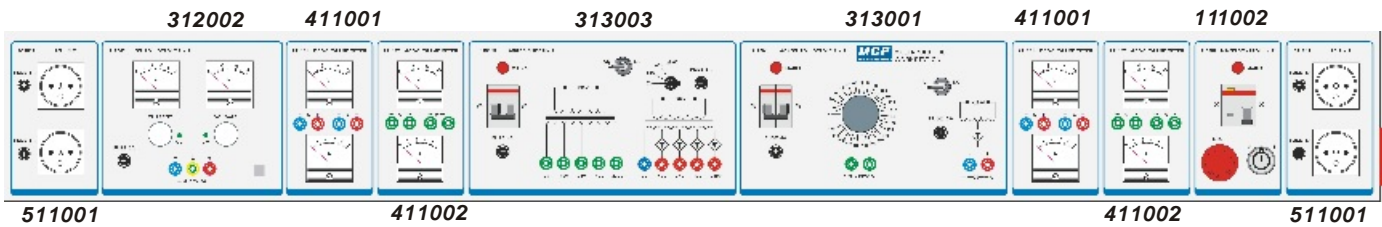
TB150-1



Three phase power input socket



TB150-2



TB150-3

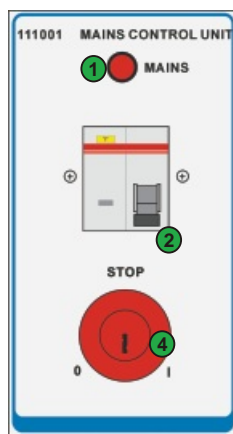


ONE-PHASE AND THREE-PHASE MAINS CONTROL UNIT

Model	Phase	Block(s)
111001	1	1
111002	1	1
132001	3	2
132002	3	2

*N Block(s) size (W×H×D) = (100×N)×194×231 mm

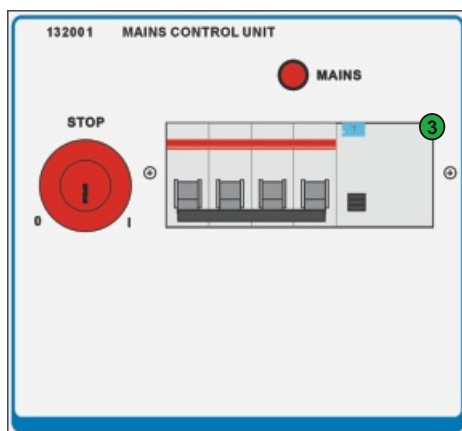
- ① : Indicator of On/Off
- ② : Single-phase electronic magnetic break switch (400V, 10A) and leakage protection switch (30mA)
- ③ : Three-phase electronic magnetic break switch (690V, 50A) and leakage protection switch (30mA)
- ④ : Emergency switch with On/Off key (660V, 10A)
- ⑤ : Emergency switch (660V, 10A)
- ⑥ : On/Off key (660V, 10A)



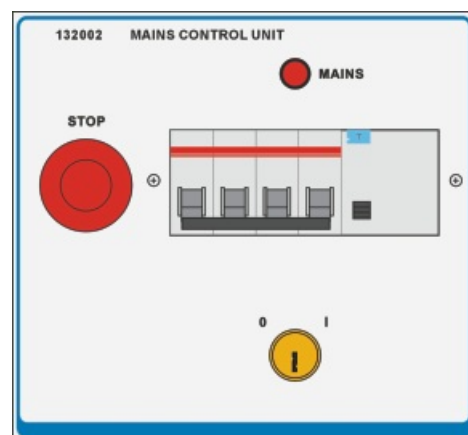
111001



111002



132001



132002

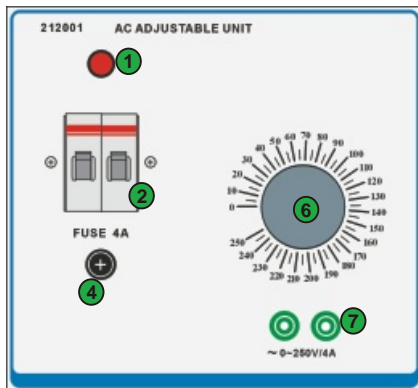
AC POWER SUPPLY UNIT



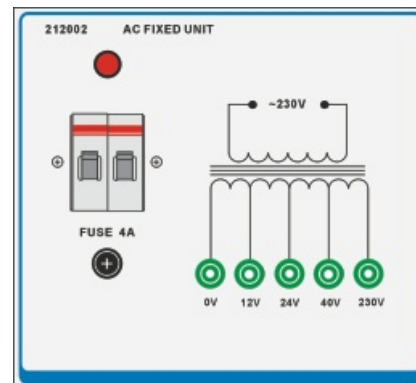
Model	AC output	Phase	Block(s)
212001	0~250V/4A	1	2
212002	12V/24V/40V/250V/4A	1	2
234001	0~250V/4A X 3Phase	3	4
232002	230V/4A X 3Phase	3	2

*N Block(s) size (W×H×D) = (100×N)×194×231 mm

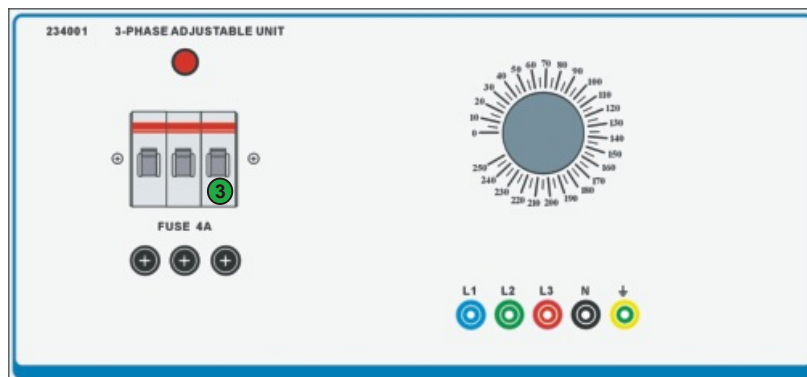
- ① : Indicator of on/off
- ② : Single-phase electronic magnetic break switch (400V, 10A)
- ③ : Three-phase electronic magnetic break switch (690V, 50A)
- ④ : Output fuse protection
- ⑤ : Three-phase output socket
- ⑥ : Voltage adjusting knob
- ⑦ : Output safety sockets



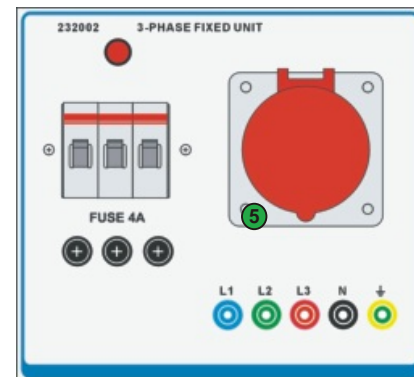
212001



212002



234001



232002

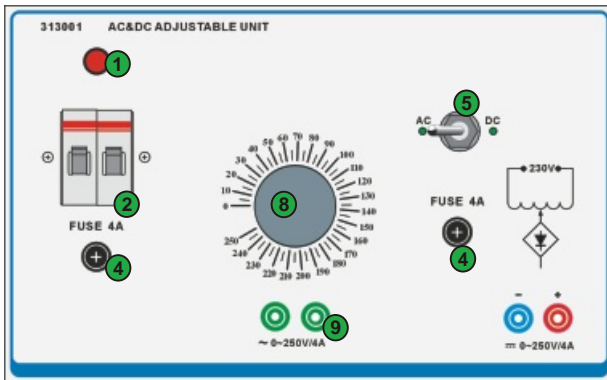
DC & AC POWER SUPPLY UNIT



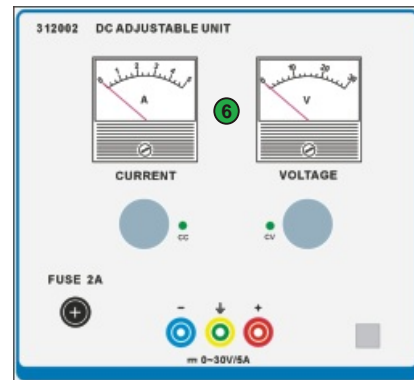
Model	AC output	DC output	Block(s)
313001	0~250V/4A	0~250V/4A(rectified DC)	3
312002	NA	0~30V/0~5A(regulated DC)	2
313003	12V/24V/40V/250V/4A	12V/24V/40V/250V/4A(rectified DC)	3
311004	NA	24V/10A(switching power supply)	1
334005	0~250V/4A X 3Phase	0~250V/4A(three phase rectified, 4% small ripple)	4

*N Block(s) size (W×H×D) = (100×N)×194×231 mm

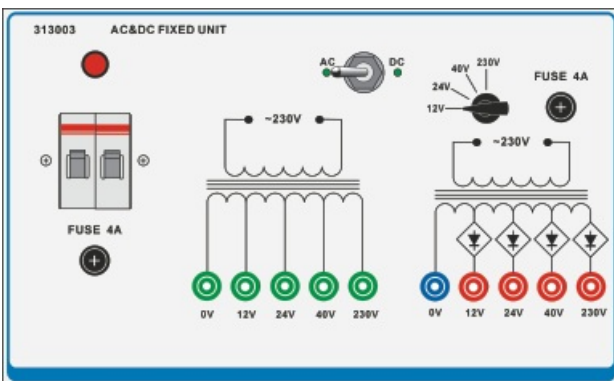
- ① : Indicator of on/off
- ② : Single-phase electronic magnetic break switch (400V, 10A)
- ③ : Three-phase electronic magnetic break switch (690V, 50A)
- ④ : Output fuse protection
- ⑤ : AC/DC output change switch
- ⑥ : Current meter and voltage meter
- ⑦ : On/Off switch with LED indicator
- ⑧ : Voltage adjusting knob
- ⑨ : Output safety sockets



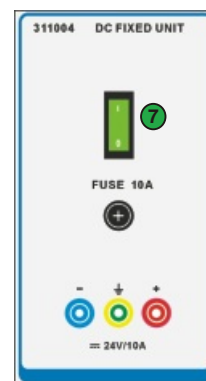
313001



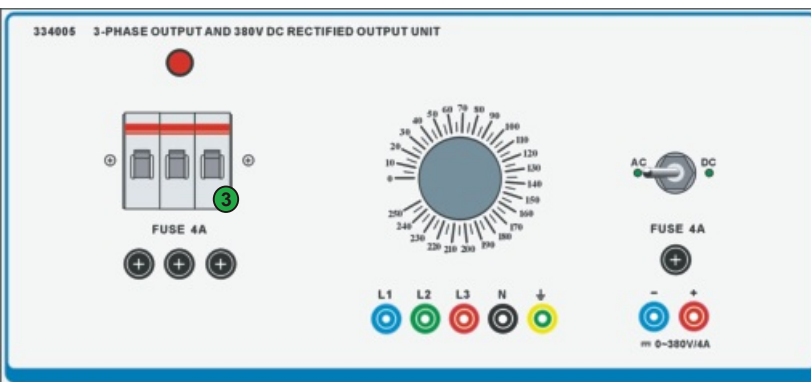
312002



313003

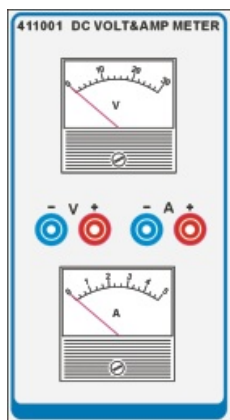


311004

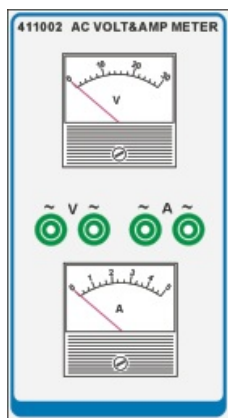


334005

METER UNIT



411001



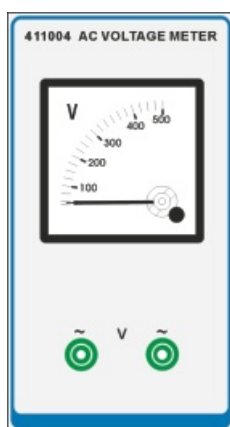
411002

Model	Class	Block
411001	2.5	1
411002	2.5	1
411003	1.5	1
411004	1.5	1
411005	1.5	1
411006	1.5	1

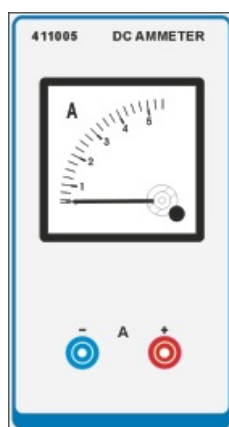
*N Block(s) size (W×H×D) = (100×N)×194×231 mm



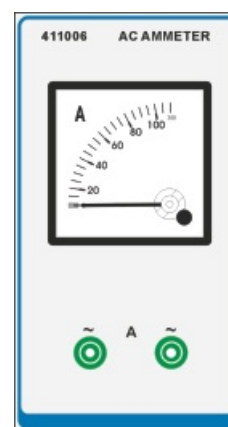
411003



411004



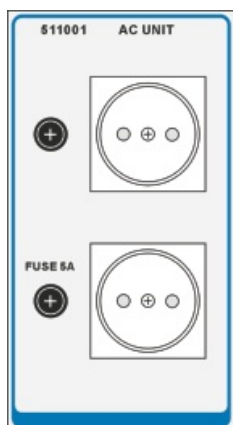
411005



411006

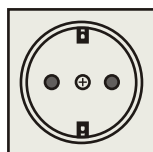
Note: Other measuring range can also be customized

SOCKET UNIT



511001

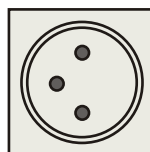
511001 support the following kinds of power socket



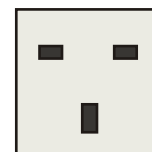
Germany



France



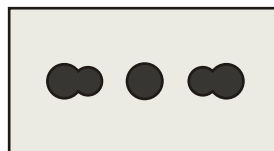
Spain



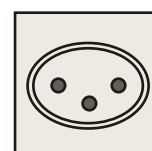
United Kingdom



Greece



Italy



Switzerland

Model	Block
511001	1

*N Block(s) size (W×H×D) = (100×N)×194×231 mm

EH818

EXPERIMENT SYSTEM OF ELECTRICAL INSTALLATIONS AND TESTING TECHNIQUES**Features**

- .Represent a small size building for residential use
- .Analyze the correct mounting procedures such as:
 1. Light and EMF distribution systems with energy counter (kWh)
 2. Stair light system
 3. Interphone system
 4. Protective earth and equipotential system
- .Testing of electrical installations according to the international (IEC) standards.
- .Measure insulation, fault loop, impedance and voltage drop
- .Execute continuity tests and checking of the protection devices on already wired and operative circuits
- .Carrying out changes and transformations on already existing installations.

**Specifications**

- .Mechanical characteristics
- .Build in welded, chemically treated and epoxy painted sheet steel
- .Each of the 4 available walls, several electrical and electronic components, embedded into flush-mounted junction boxes, are placed over hinged panels
- .Whole structure is set on a wheel mobile base

Dimensions (W×H×D): 880×1300×800 mm

Weight: 100kg

Electrical characteristics**Wall 1 (main entrance)**

- 1 Main power supply 230 V 16 A
- 1 Single-phase energy counter 230 V 20 A
- 1 Switchboard with earth leakage circuit brake and 3 thermal-magnetic circuit breakers
- 1 Interphone porter with 2 pushbuttons and 2 illuminated name-plates
- 1 Electric lock
- 1 Equipotential protective earth collector
- 1 Ground connections with 1-ohm resistor and sectioning terminals



Wall 2 (sitting room and kitchen)

- 1 Light installation with incandescent lamps 230V controlled by 2 pushbuttons and step-by-step relay
- 2 Outlets 230V 16A for sitting room users
- 1 Incandescent lamp 230V with dimmer
- 1 Door bell
- 1 Thermostat (day-time area)
- 1 Low energy consumption lamp controlled by two-way switches
- 2 Outlets 230V 16 A for electric household appliances
- 1 Interphone communicating with the gate porter
- 1 Buzzer for calls from bathroom



Wall 3 (bedroom and bathroom)

- 1 Incandescent lamp controlled by 2 two-way switches and 1 intermediate switch
- 1 Outlet 230V 16A for electrical household appliances
- 1 Single-phase outlet 230V 10A for the lights
- 1 Thermostat (night-time area)
- 2 Pushbuttons for service call
- 1 Pushbutton for emergency calls from the bathroom
- 1 Thermostat (bathrooms)
- 1 Outlet 230V 16A for boiler supply.

Wall 4 (office, stairwell, heating plant)

- 2 Lamps with switch
- 1 Outlet 230V 16A for electric household appliances
- 1 Single-phase outlet 230V 10A for lights
- 1 Interphone communicating with the gate porter
- 1 Incandescent lamp 230V with two pushbuttons and time relay
- 1 Outlets 230V 16A for heating plant
- 3 Pilot lamps (simulation of water pumps for different heating areas)

