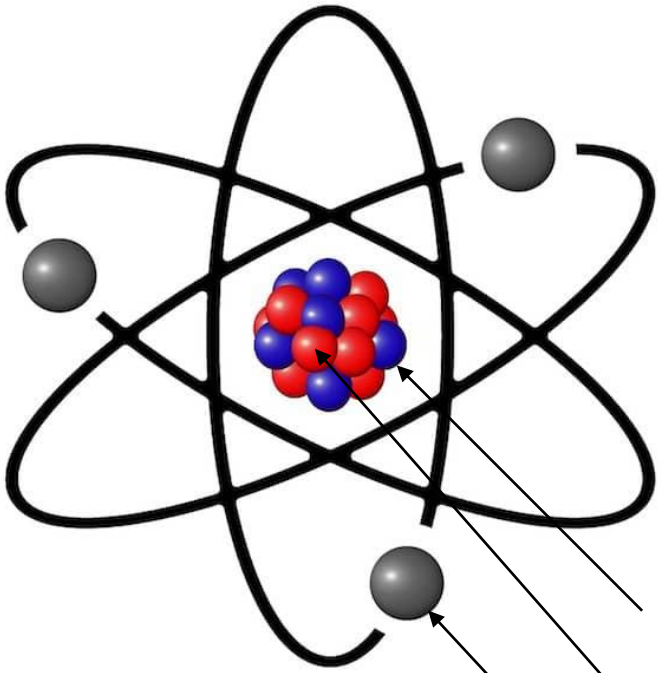
CURSO

ELECTRONICA BASICA

Ing. Brain Naser Soto

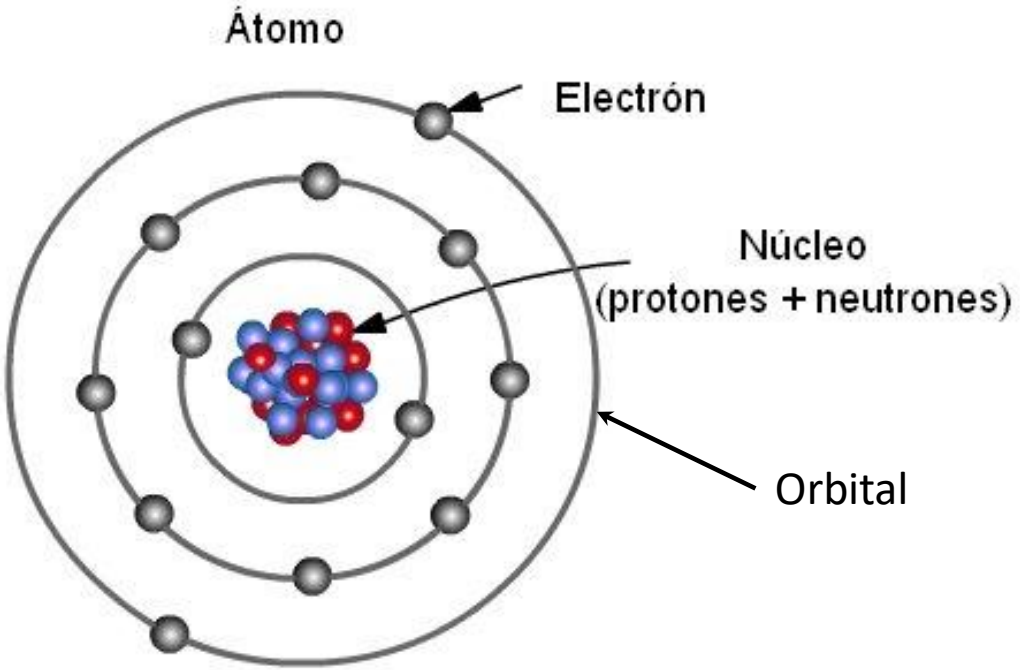
ELECTRICIDAD 1: EL ATOMO



Neutrón (0)

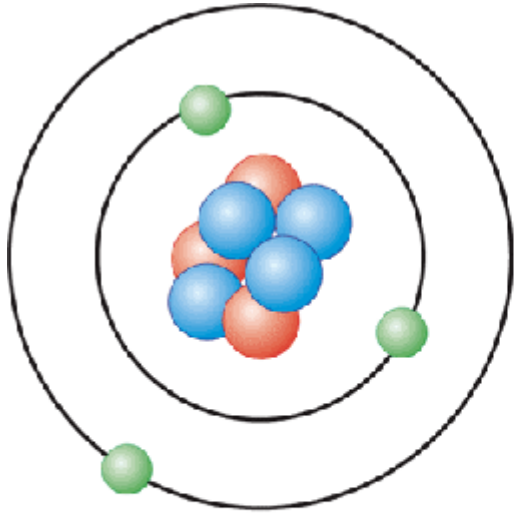
Protón (+)

Electrón (-)



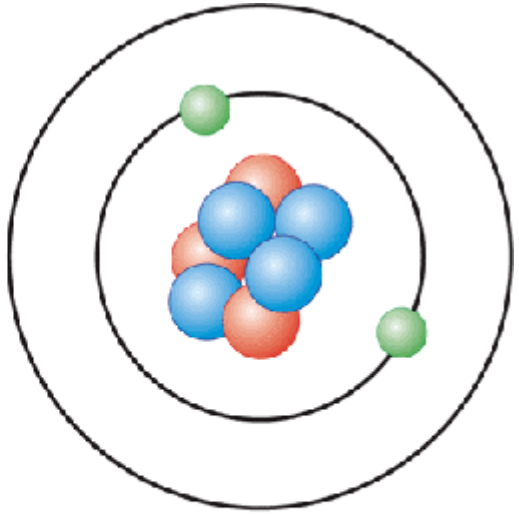
NÚMERO ATÓMICO
ORBITALES
ELECTRONES DE VALENCIA

ATOMO



Protones = 3
Neutrones = 4
Electrones = 3

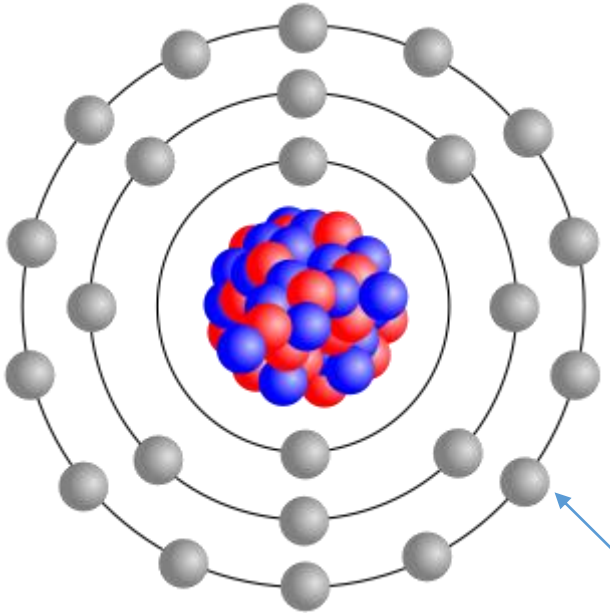
ION



Protones = 3
Neutrones = 4
Electrones = 2

Z=3

NÚMERO ATÓMICO
IONES
ATRACCION / REPULSIÓN



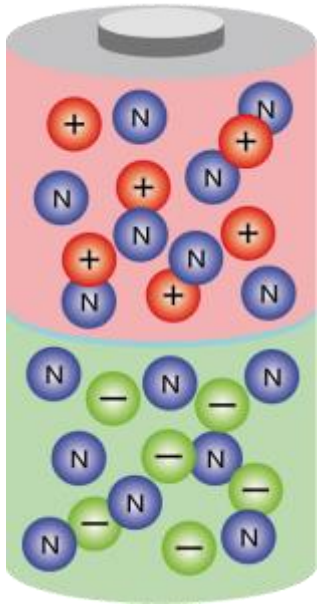
ELECTRONES DE VALENCIA
ORBITALES

TABLA PERIÓDICA DE LOS ELEMENTOS

PERIODO	GRUPO 1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1 1.008 H HIDRÓGENO																	2 4.0026 He HELIO
2	3 6.94 Li LITIO	4 9.0122 Be BERILIO											5 10.81 B BORO	6 12.011 C CARBONO	7 14.007 N NITRÓGENO	8 15.999 O OXÍGENO	9 18.998 F FLÚOR	10 20.180 Ne NEÓN
3	11 22.990 Na SODIO	12 24.305 Mg MAGNESIO											13 26.982 Al ALUMINIO	14 28.085 Si SILICIO	15 30.974 P FÓSFORO	16 32.06 S AZUFRE	17 35.45 Cl CLORO	18 39.948 Ar ARGÓN
4	19 39.098 K POTASIO	20 40.078 Ca CALCIO	21 44.956 Sc ESCANDIO	22 47.867 Ti TITANIO	23 50.942 V VANADIO	24 51.996 Cr CROMO	25 54.938 Mn MANGANESO	26 55.845 Fe HIERRO	27 58.933 Co COBALTO	28 58.693 Ni NIQUEL	29 63.546 Cu COBRE	30 65.38 Zn ZINC	31 69.723 Ga GALIO	32 72.64 Ge GERMANIO	33 74.922 As ARSÉNICO	34 78.971 Se SELENIO	35 79.904 Br BROMO	36 83.798 Kr KRIPTÓN
5	37 85.468 Rb RUBIDIO	38 87.62 Sr ESTRONCIO	39 88.906 Y ITRIO	40 91.224 Zr CIRCONIO	41 92.906 Nb NIOBIO	42 95.95 Mo MOLIBDENO	43 (98) Tc TECNECIO	44 101.07 Ru RUTENIO	45 102.91 Rh RODIO	46 106.42 Pd PALADIO	47 107.87 Ag PLATA	48 112.41 Cd CADMIO	49 114.82 In INDIO	50 118.71 Sn ESTAÑO	51 121.76 Sb ANTIMONIO	52 127.60 Te TELURIO	53 126.90 I YODO	54 131.29 Xe XENÓN
6	55 132.91 Cs CESIO	56 137.33 Ba BARIO	57-71 La-Lu Lantánidos	72 178.49 Hf HAFNIO	73 180.95 Ta TÁNTALO	74 183.84 W WOLFRAMIO	75 186.21 Re RENIO	76 190.23 Os OSMIO	77 192.22 Ir IRIDIO	78 195.08 Pt PLATINO	79 196.97 Au ORO	80 200.59 Hg MERCURIO	81 204.38 Tl TALIO	82 207.2 Pb PLOMO	83 208.98 Bi BISMUTO	84 (209) Po POLONIO	85 (210) At ASTATO	86 (222) Rn RADÓN
7	87 (223) Fr FRANCIO	88 (226) Ra RADIO	89-103 Ac-Lr Actínidos	104 (267) Rf RUTHERFORDIO	105 (268) Db DUBNIO	106 (271) Sg SEABORGIO	107 (272) Bh BOHRIO	108 (277) Hs HASIO	109 (276) Mt MEITNERIO	110 (281) Ds DARMSTATIO	111 (280) Rg ROENTGENIO	112 (285) Cn COPERNICIO	113 (285) Nh NIHONIO	114 (287) Fl FLEROVIO	115 (289) Mc MOSCOVIO	116 (291) Lv LIVERMORIO	117 (294) Ts TENESO	118 (294) Og OGANESÓN

LANTÁNIDOS	57 138.91 La LANTANO	58 140.12 Ce CERIO	59 140.91 Pr PRASEODIMIO	60 144.24 Nd NEODIMIO	61 (145) Pm PROMETIO	62 150.36 Sm SAMARIO	63 151.96 Eu EUROPIO	64 157.25 Gd GADOLINIO	65 158.93 Tb TERBIO	66 162.50 Dy DISPROSIO	67 164.93 Ho HOLMIO	68 167.26 Er ERBIO	69 168.93 Tm TULIO	70 173.05 Yb YTERBIO	71 174.97 Lu LUTECIO
ACTÍNIDOS	89 (227) Ac ACTINIO	90 232.04 Th TORIO	91 231.04 Pa PROTACTINIO	92 238.03 U URANIO	93 (237) Np NEPTUNIO	94 (244) Pu PLUTONIO	95 (243) Am AMERICIO	96 (247) Cm CURIO	97 (247) Bk BERKELIO	98 (251) Cf CALIFORNIO	99 (252) Es EINSTEINIO	100 (257) Fm FERMIO	101 (258) Md MENDELEVIO	102 (259) No NOBELIO	103 (262) Lr LAWRENCIO

PILA ELÉCTRICA



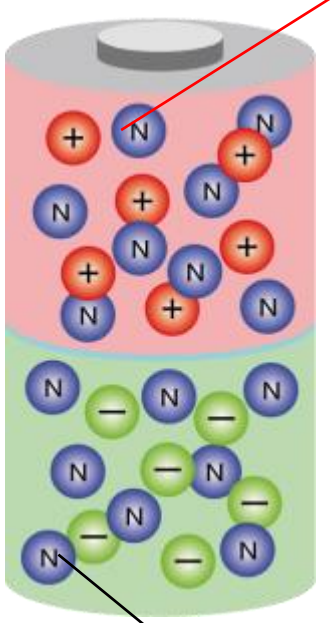
Sección con Iones Positivos
Carga Eléctrica +

Sección con Iones Negativos
Carga eléctrica -

Pilas Carbón	: 1.5V
Pilas Alkalinas	: 1.5V
Celdas Plomo-Acido	: 2.0V
Celdas Ion Litio	: 3.7V

PILA ELÉCTRICA

Sección con Iones Positivos
Carga Eléctrica +



La cantidad de elementos cargados tanto + como -, determina la energía de la pila.

Cantidad de Amperes en 1 Hora

Sección con Iones Negativos
Carga eléctrica -

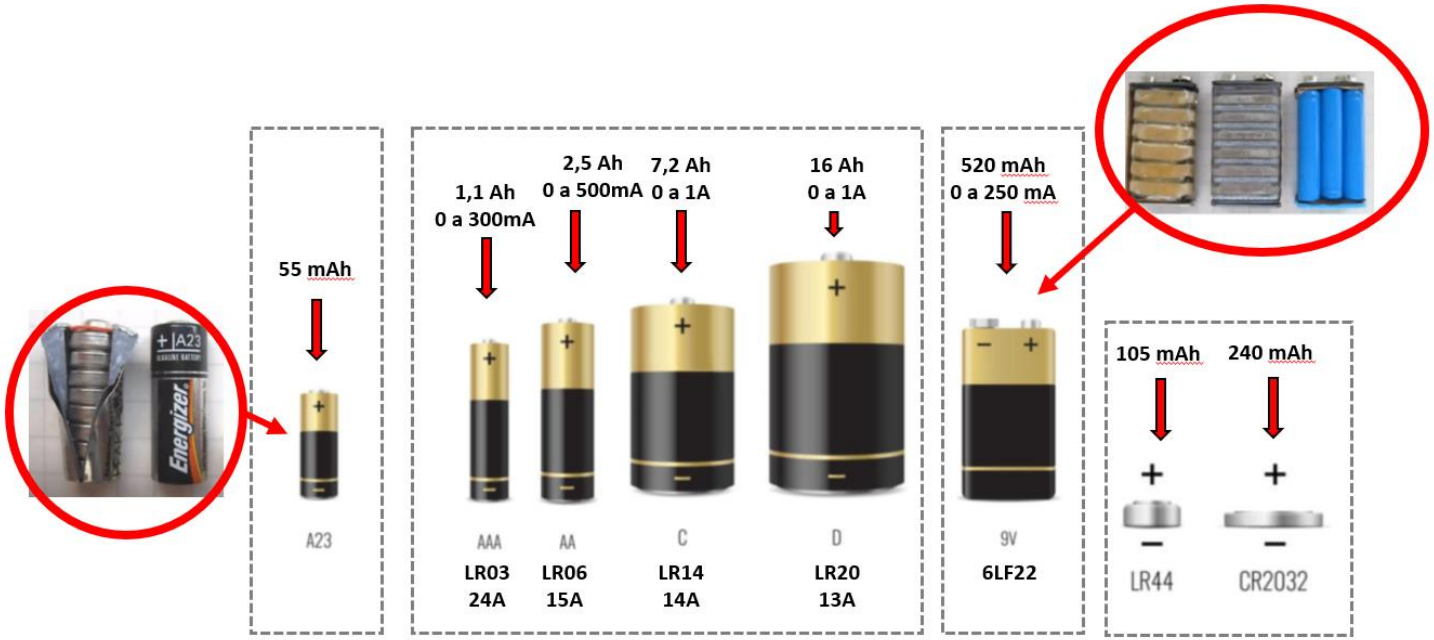
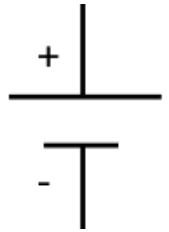
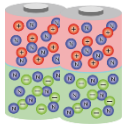


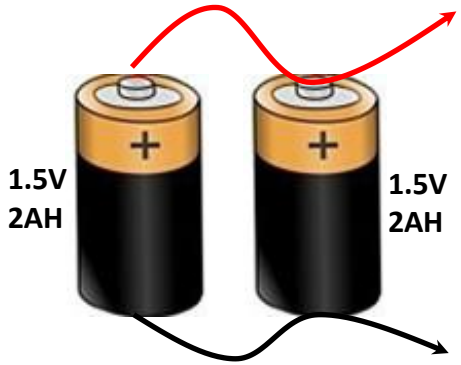
DIAGRAMA PICTÓRICO

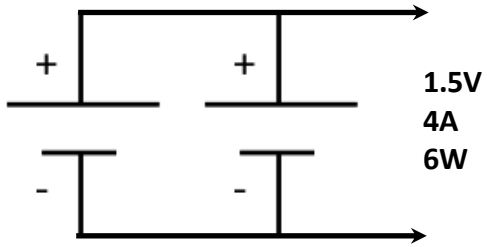
DIAGRAMA ESQUEMÁTICO



PILAS EN PARALELO

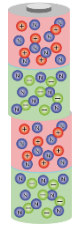


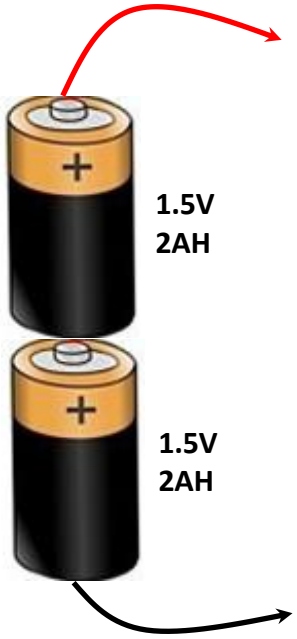


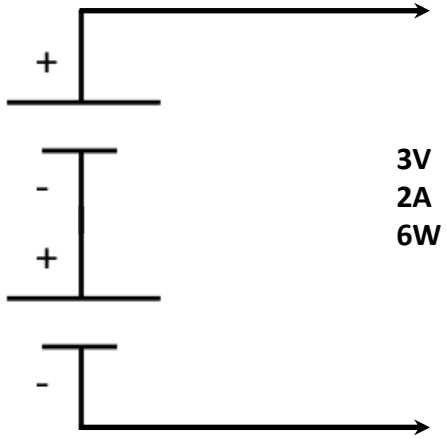


MANTIENE EL VOLTAJE
DUPLICA LA CORRIENTE

PILAS EN SERIE







DUPLICA EL VOLTAJE
MANTIENE LA CORRIENTE DE 1 PILA

VOLTAJES MÁXIMOS SEGUROS CUERPO HUMANO

60 Vdc

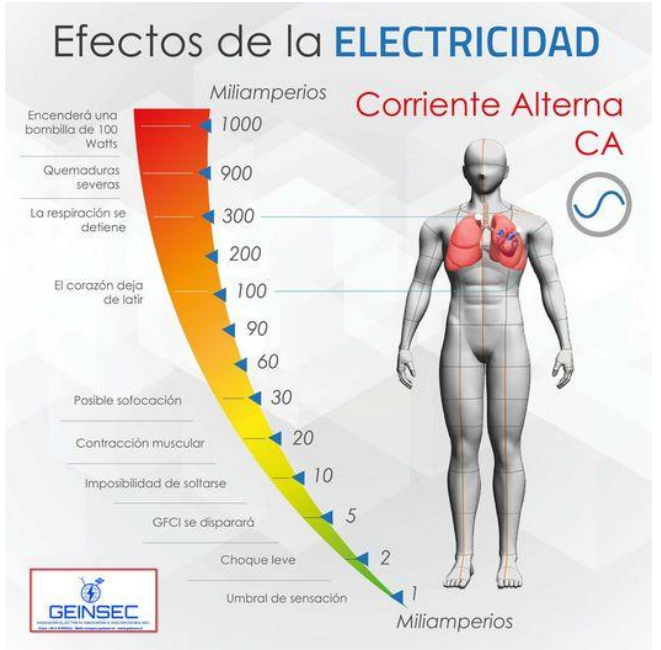
48Vdc RECOMENDADO

30 Vac RMS

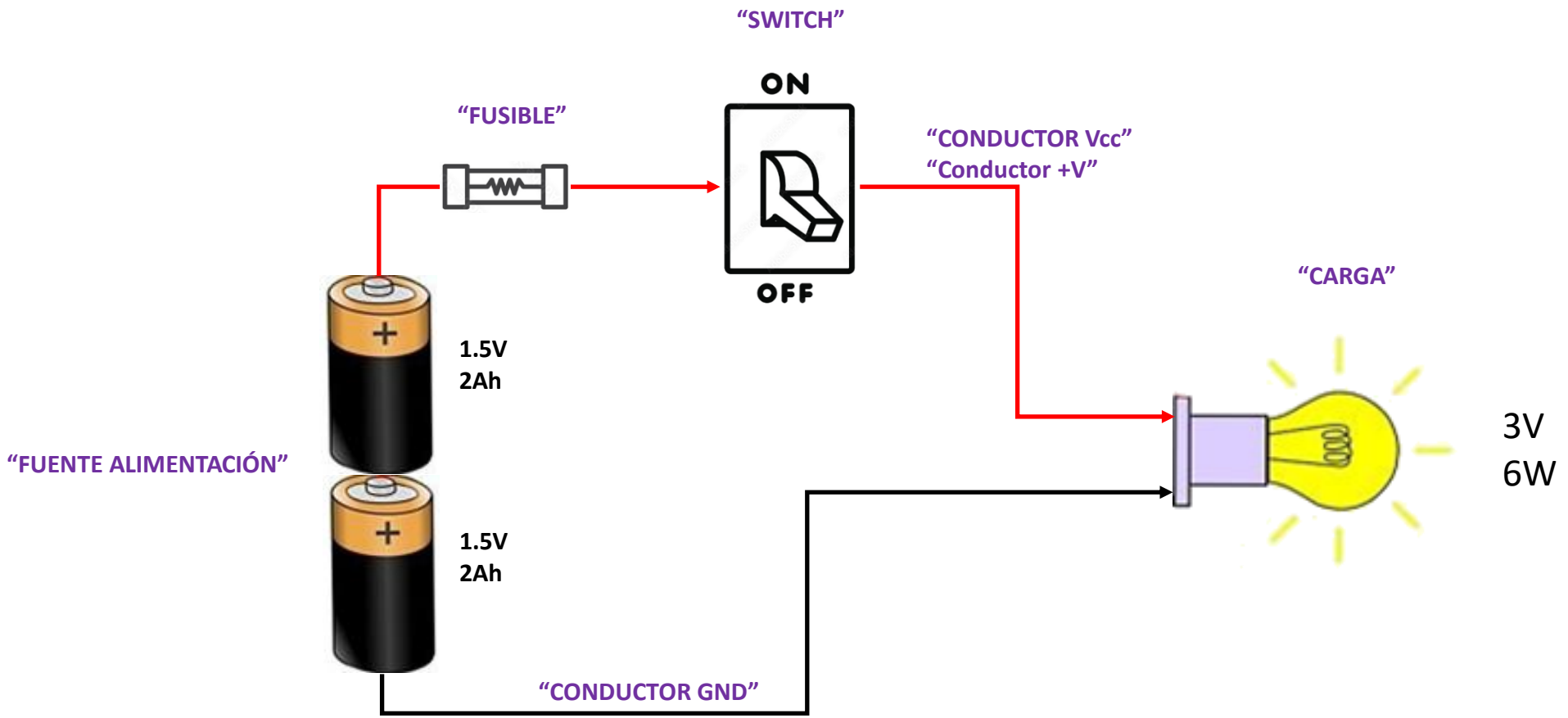
42V Peak

10mA a 20mA
Contracción Muscular

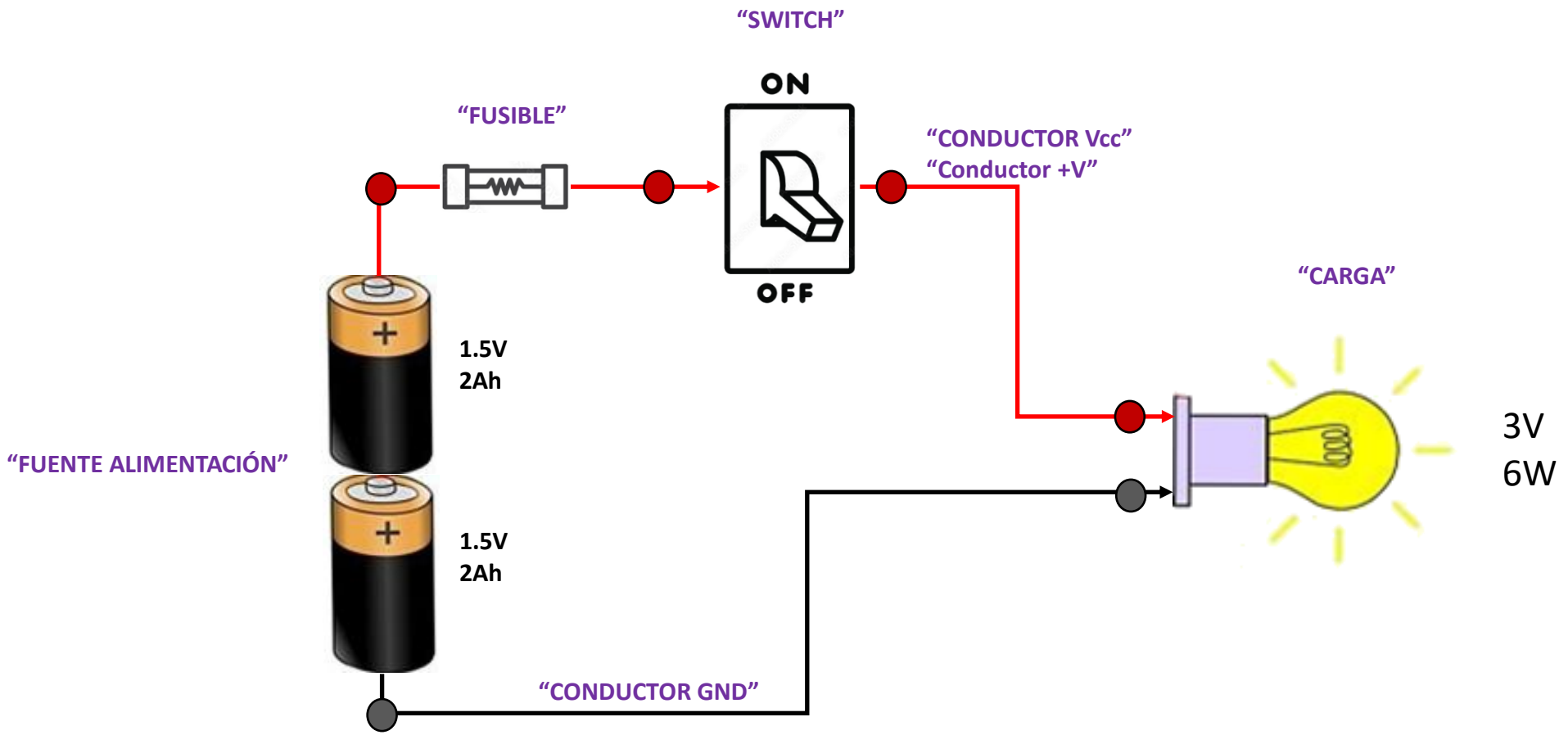
100mA
Fibrilación Cardiaca

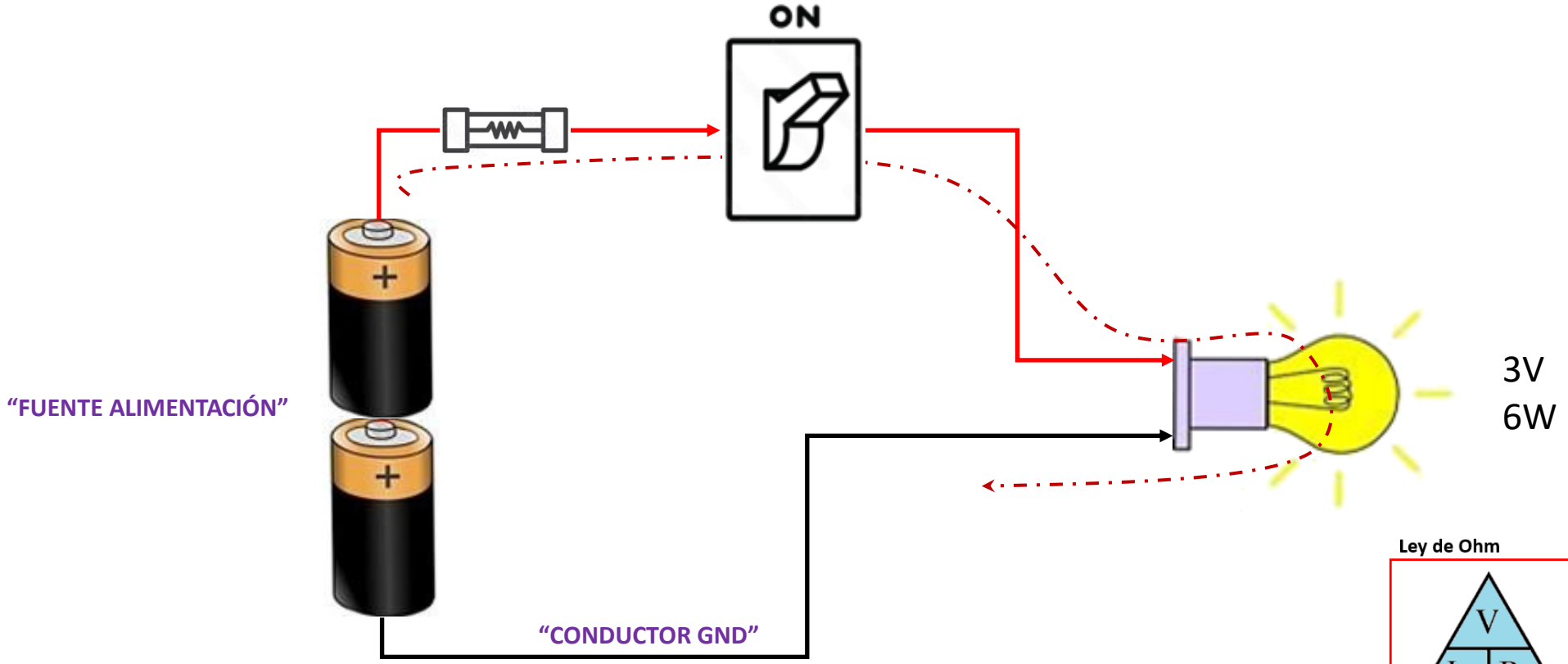


CIRCUITO ELECTRICO BÁSICO (9/12)

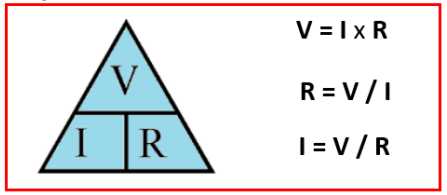


CIRCUITO ELECTRICO BÁSICO (9/12)

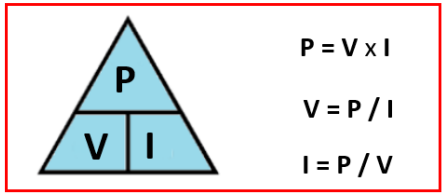


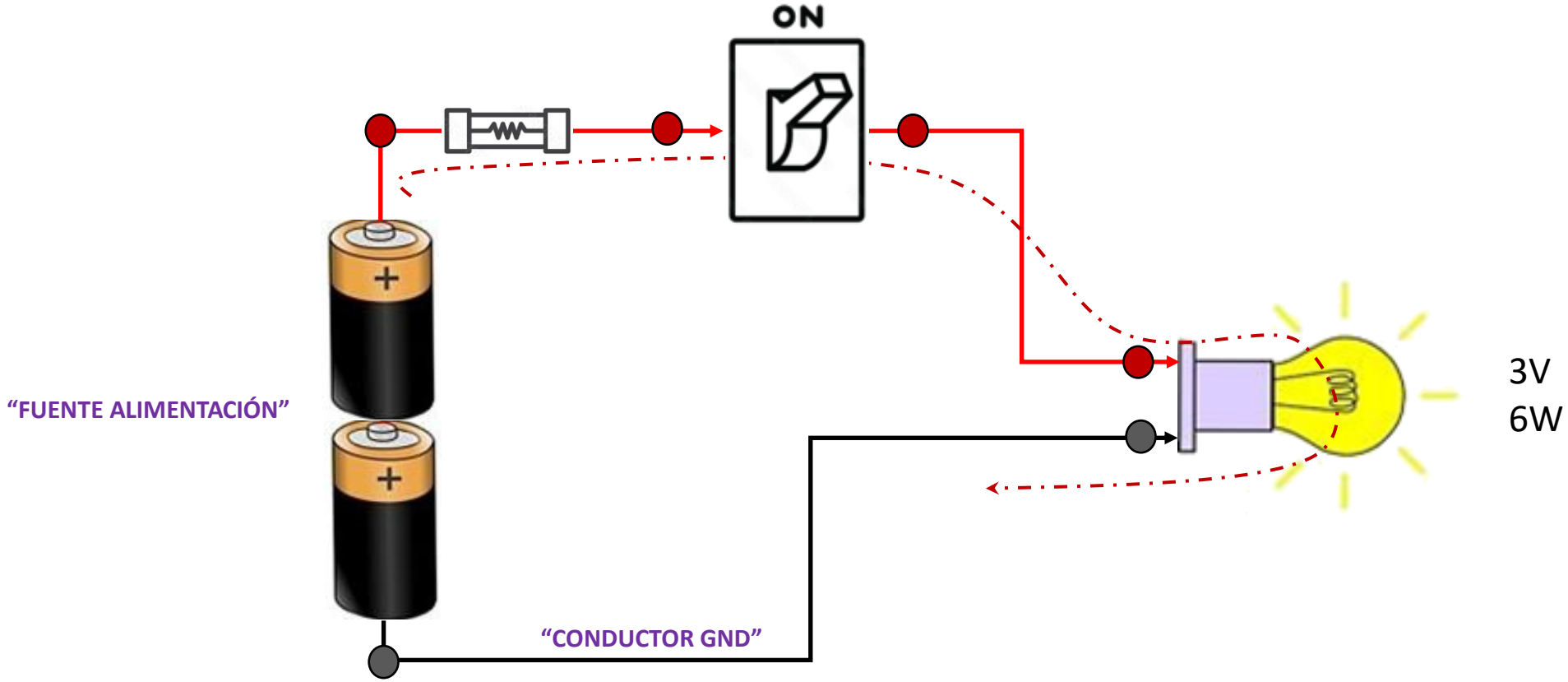


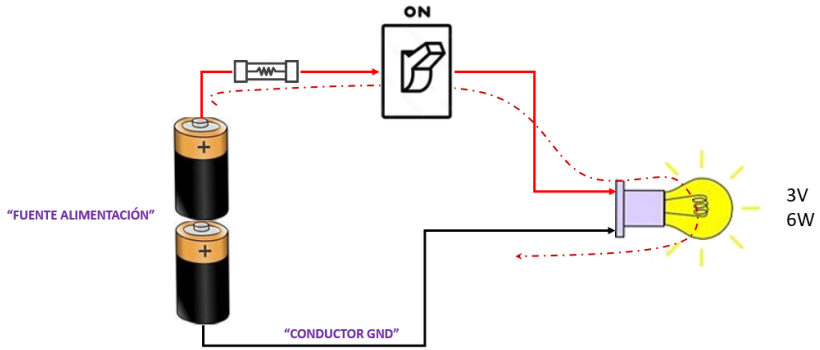
Ley de Ohm



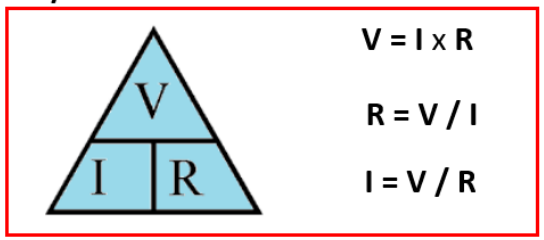
Ley de Potencias




ON
“FUENTE ALIMENTACIÓN”
“CONDUCTOR GND”
3V
6W



Ley de Ohm

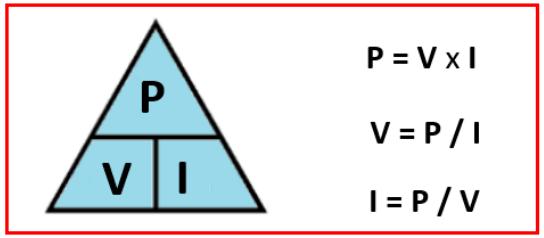


$V = I \times R$

$R = V / I$

$I = V / R$

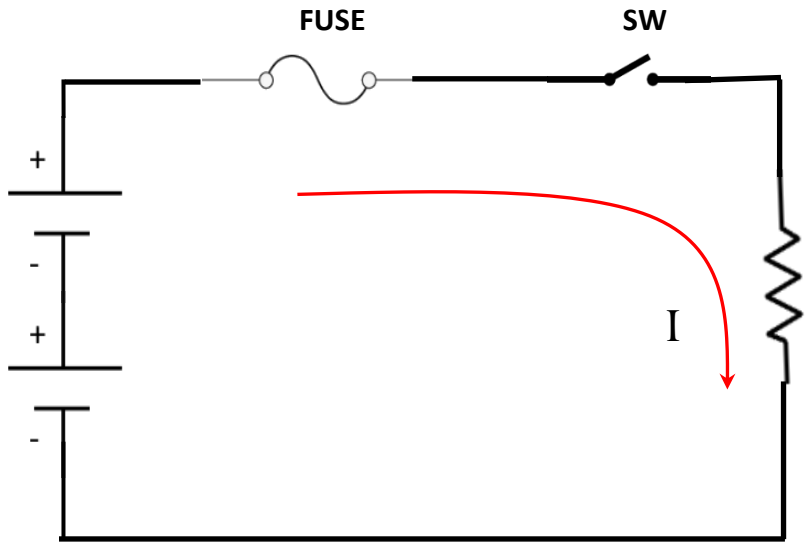
Ley de Potencias



$P = V \times I$

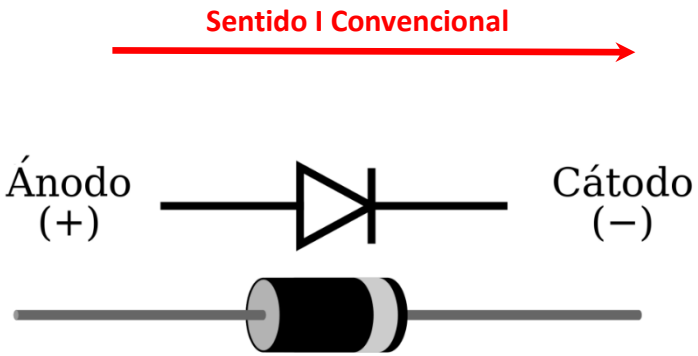
$V = P / I$

$I = P / V$

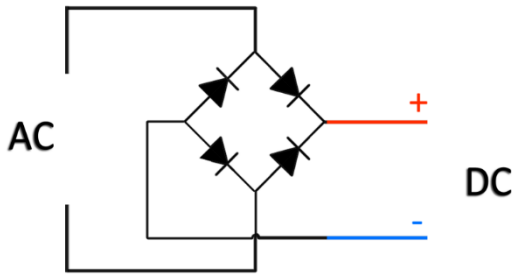


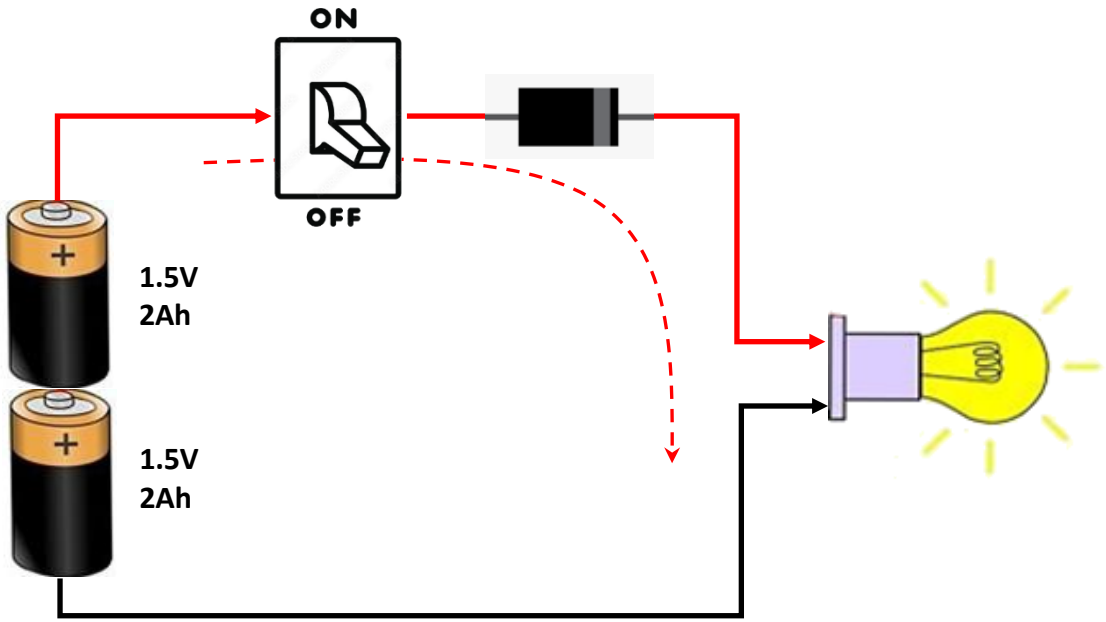
RL
Load Resistor

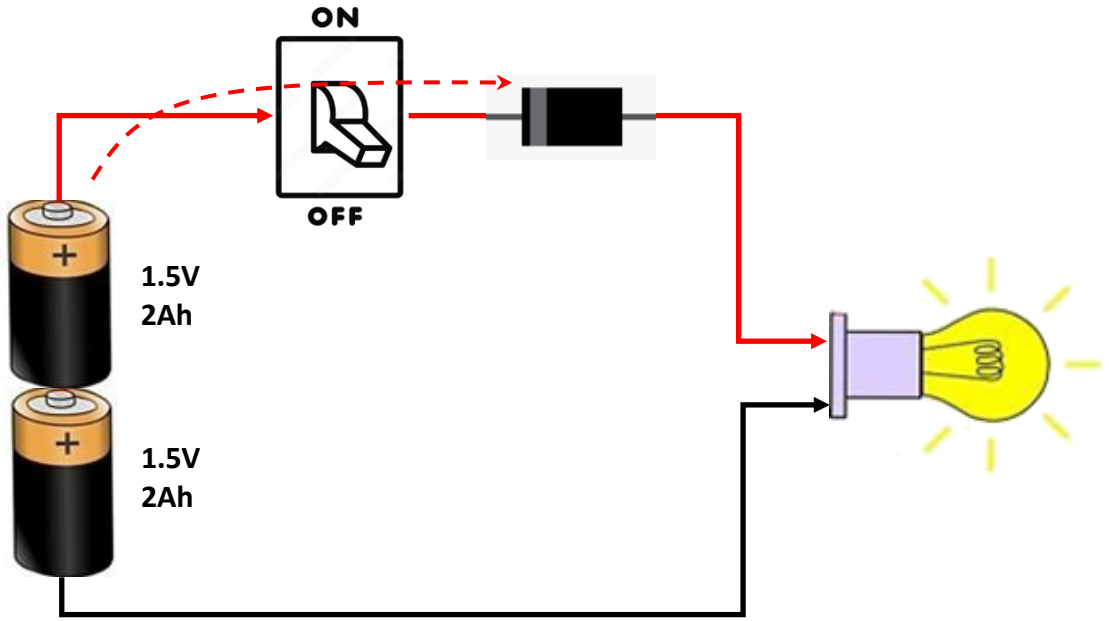
DIODOS



Puente de Graetz

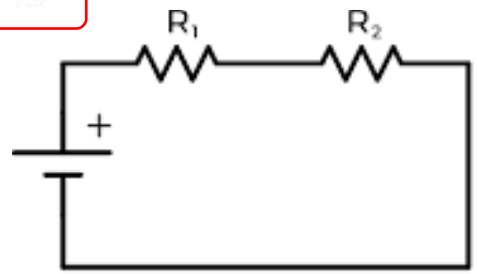



ON
OFF
1.5V
2Ah
1.5V
2Ah


ON
OFF
1.5V
2Ah
1.5V
2Ah

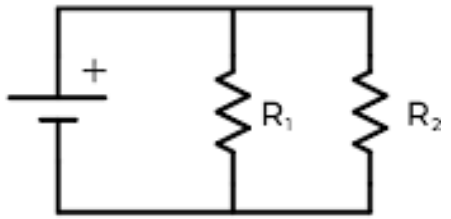
RESISTENCIAS

$$R = R_1 + R_2$$

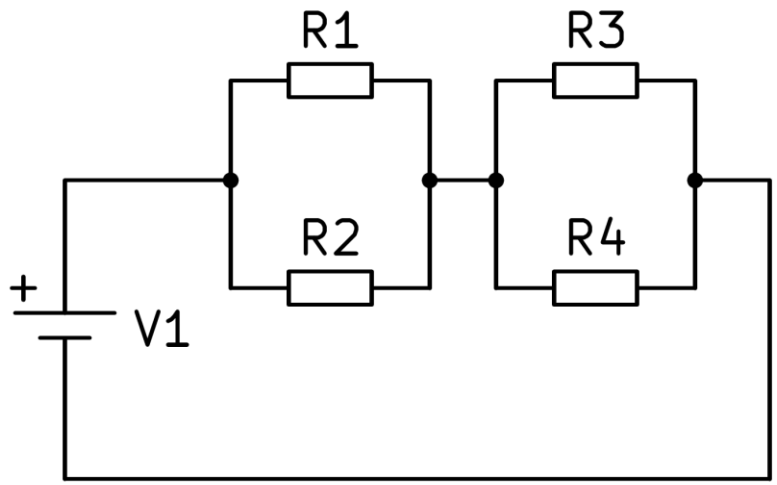


Resistencias en Serie

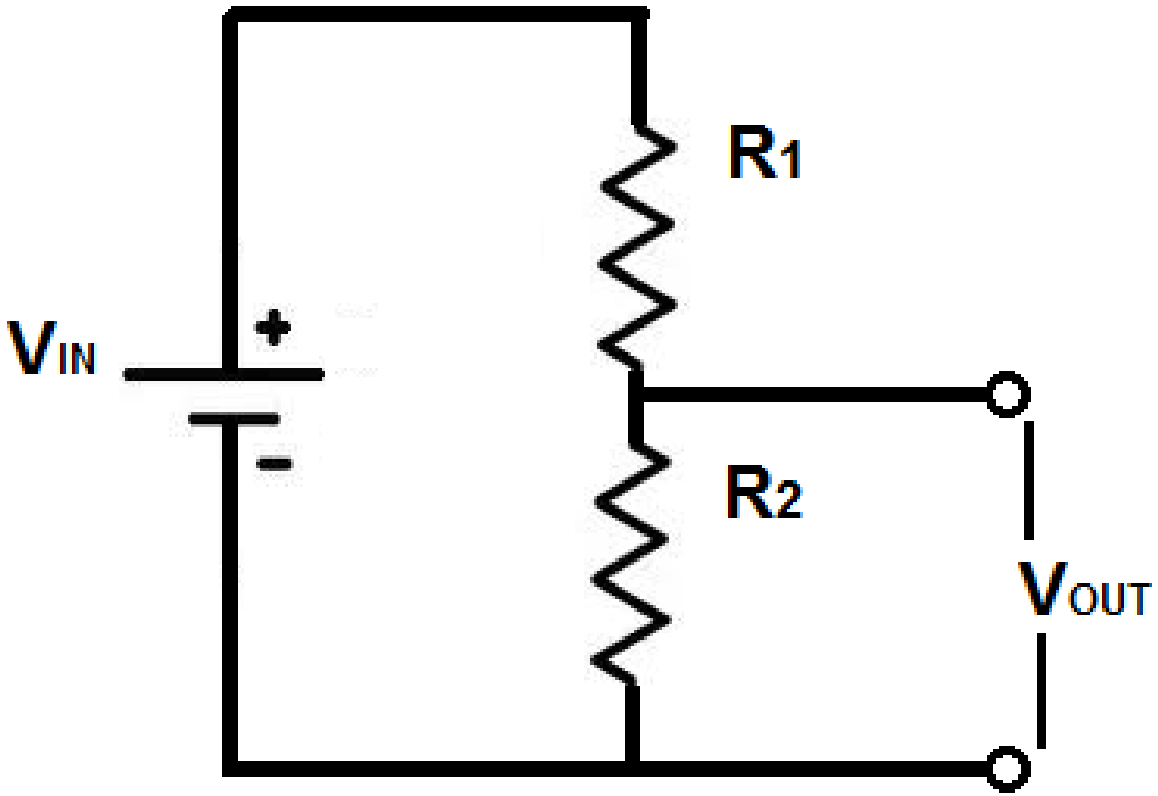
$$R = \frac{R_1 R_2}{R_1 + R_2}$$



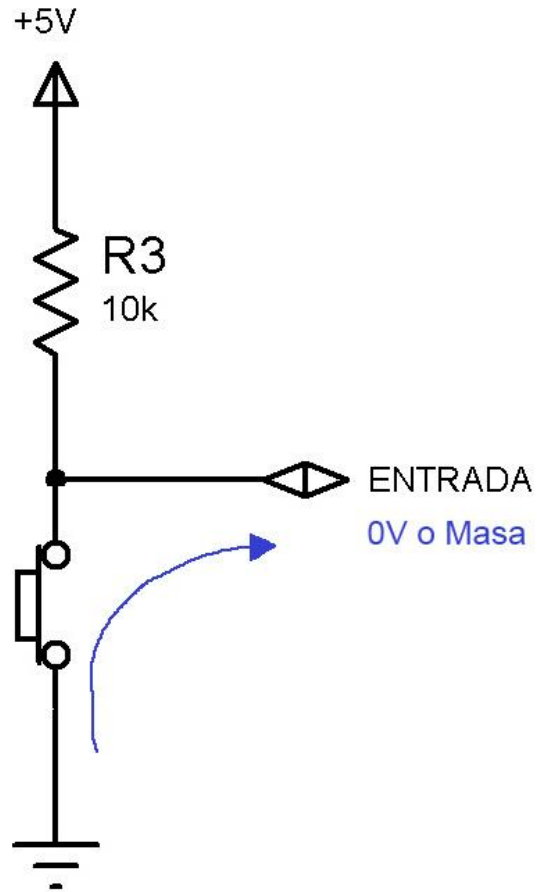
Resistencias en Paralelo

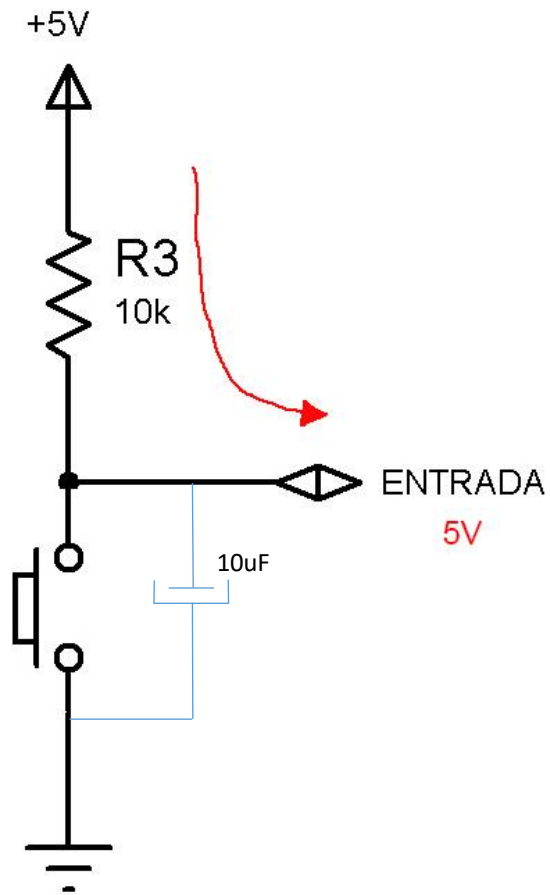


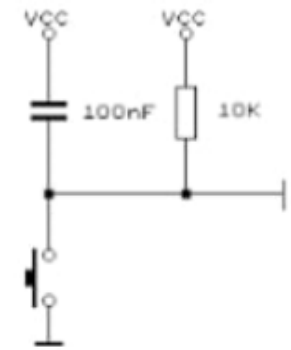
DIVISOR DE TENSIÓN



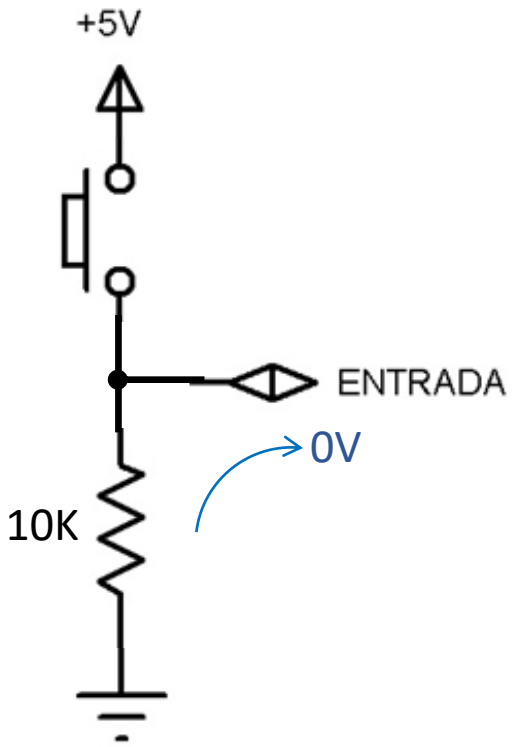
PULL-UP

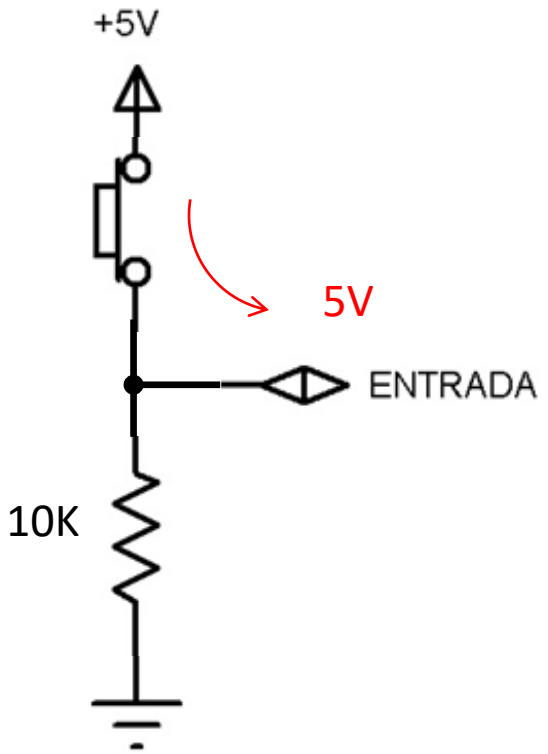

+5V
R3
10k
ENTRADA
0V o Masa

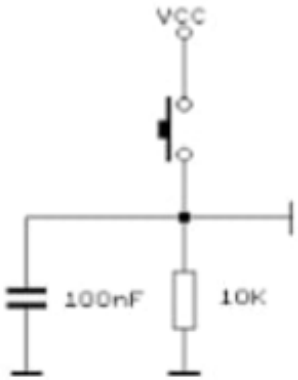

+5V
R3
10k
ENTRADA
5V
10uF


VCC
VCC
100nF
10K

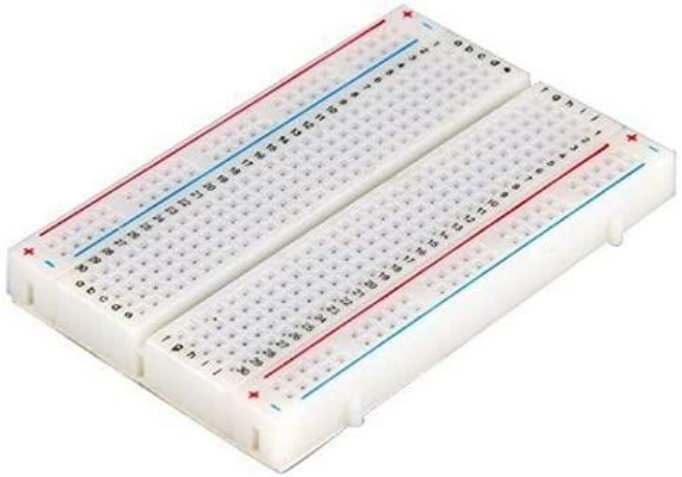
PULL-DOWN

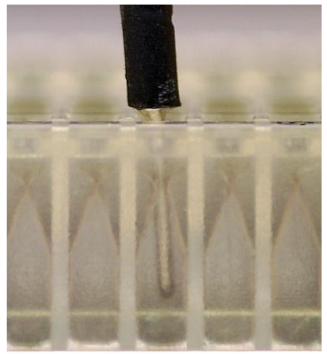


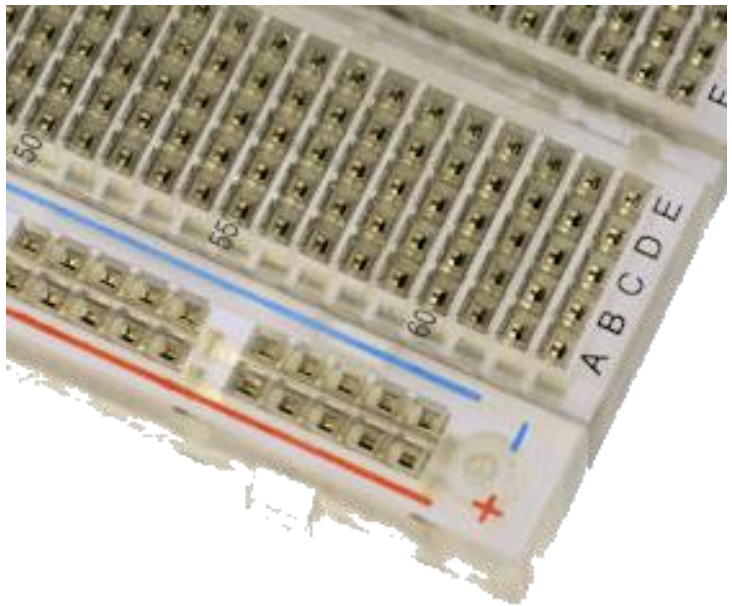


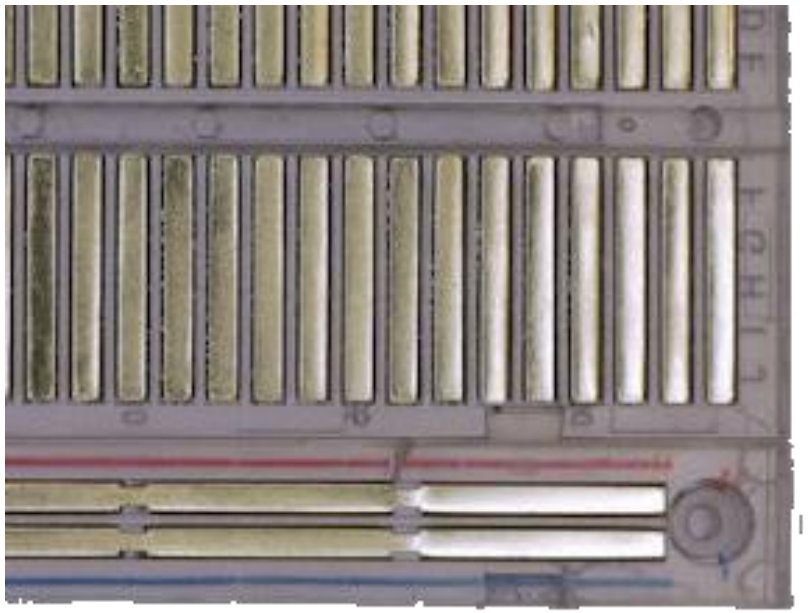


PROTOBOARD o BREADBOARD
Tablero de Conexiones sin soldadura





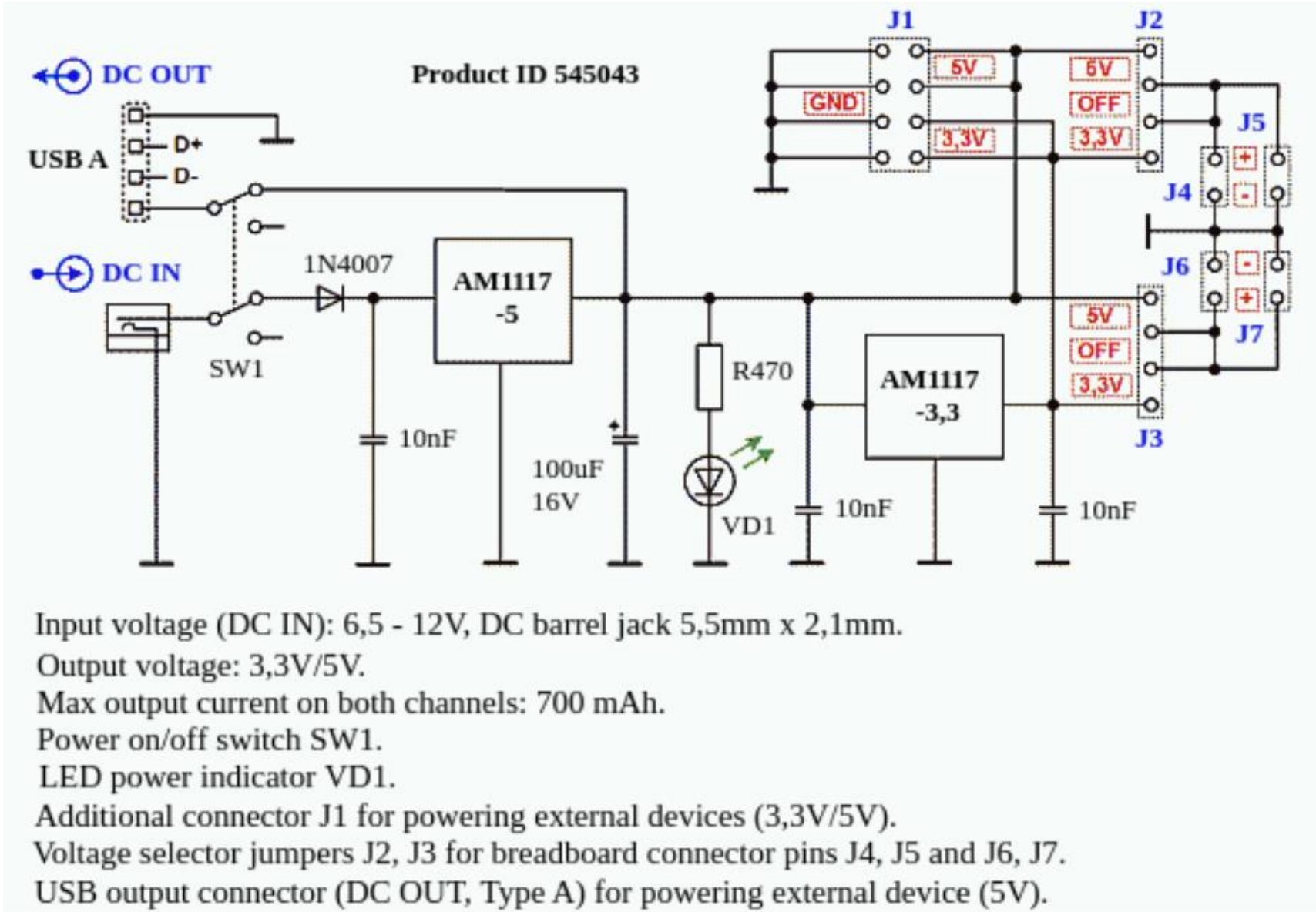




CABLE-DUPONT

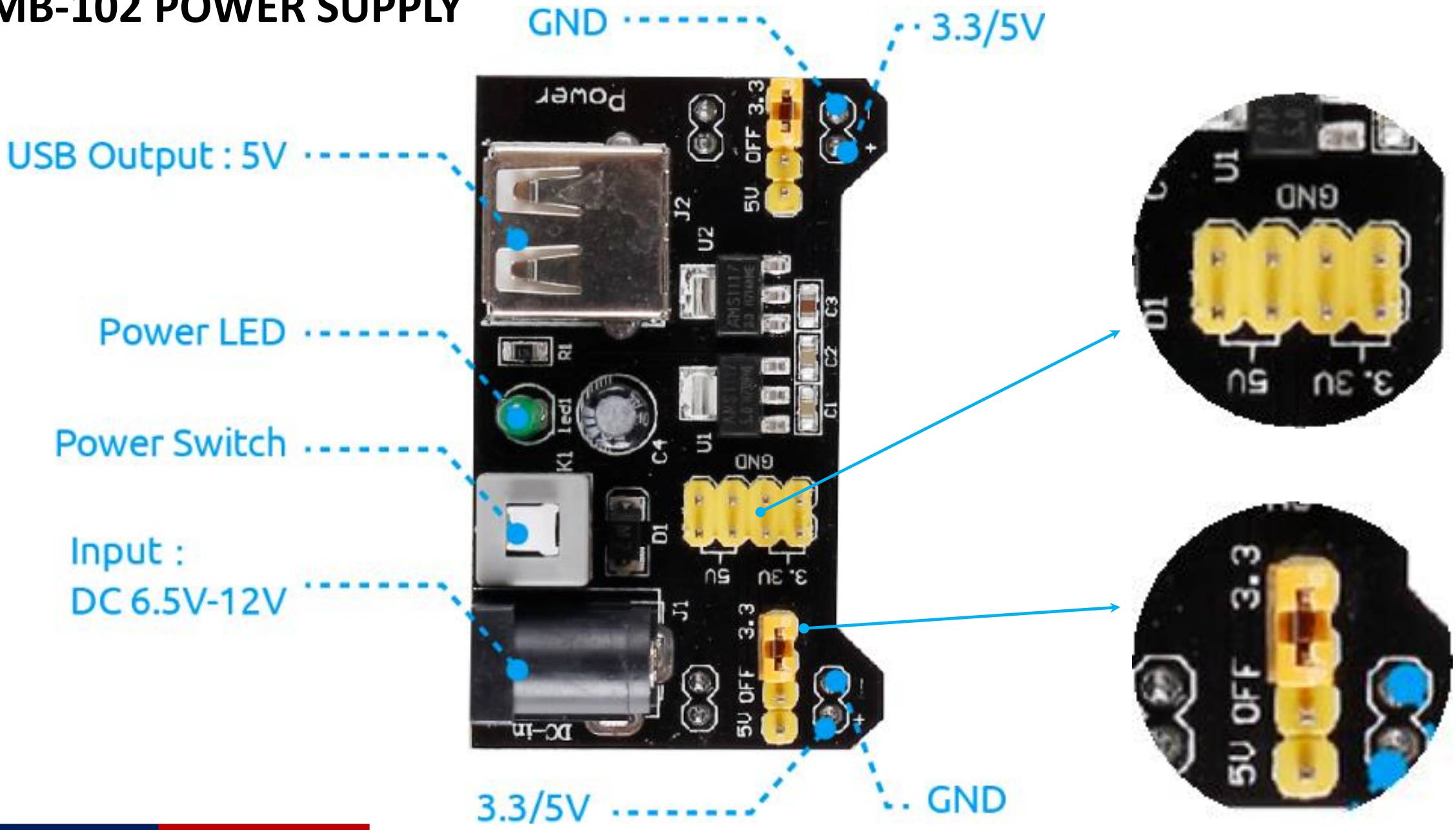
CONECTOR HEADER
“JUMPER”

MB-102 POWER SUPPLY

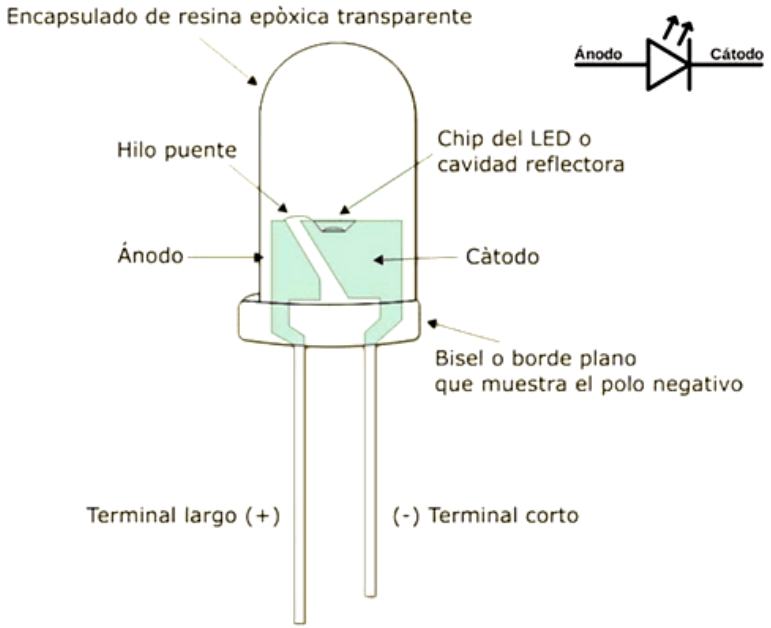


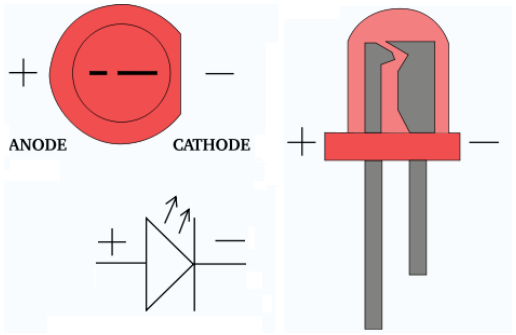
Input voltage (DC IN): 6,5 - 12V, DC barrel jack 5,5mm x 2,1mm.
Output voltage: 3,3V/5V.
Max output current on both channels: 700 mAh.
Power on/off switch SW1.
LED power indicator VD1.
Additional connector J1 for powering external devices (3,3V/5V).
Voltage selector jumpers J2, J3 for breadboard connector pins J4, J5 and J6, J7.
USB output connector (DC OUT, Type A) for powering external device (5V).

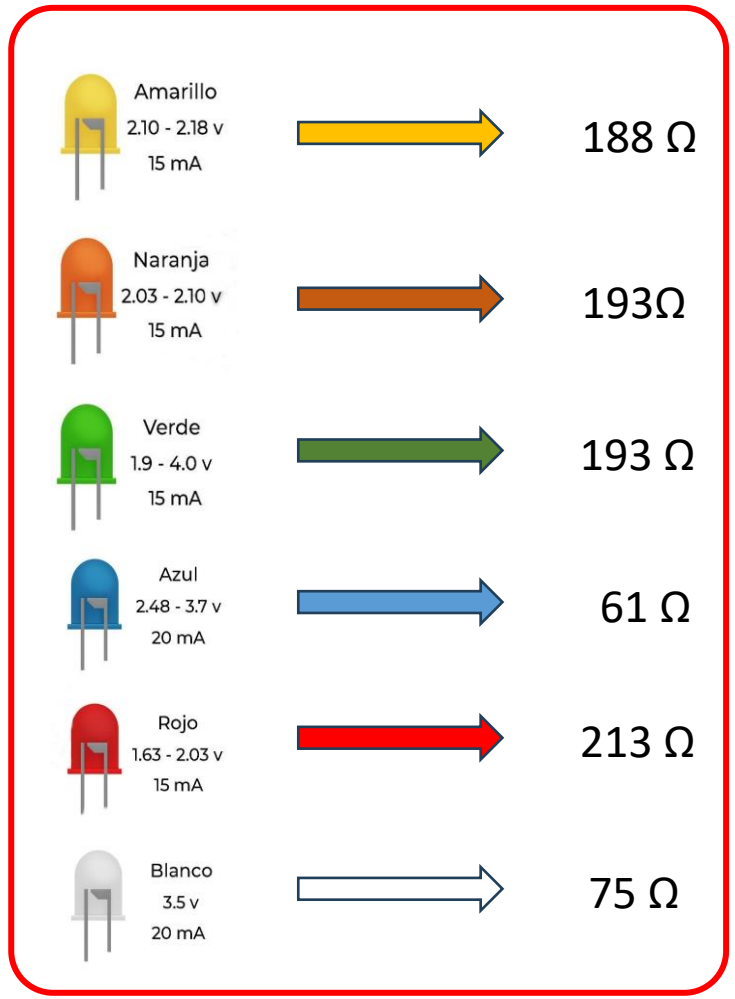
MB-102 POWER SUPPLY



DIODOS LED´S
Light Emitting Diodes







Ley de Ohm

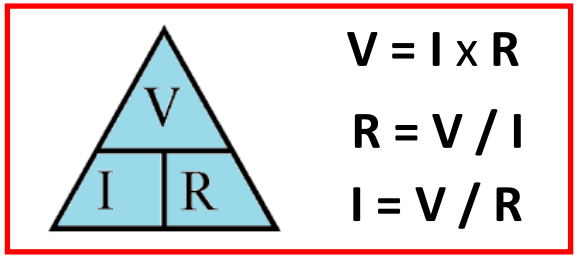
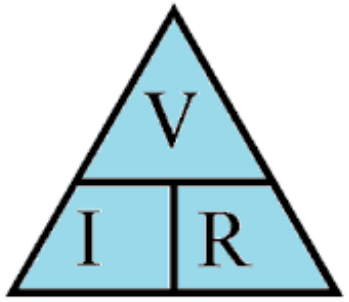


TABLA CALIBRES DE CABLES

Número AWG	Diámetro (mm)	Sección (mm2)	Número espiras por cm.	Kg. por Km.	Resistencia (O/Km.)	Capacidad (A)
0000	11,86	107,2			0,158	319
000	10,40	85,3			0,197	240
00	9,226	67,43			0,252	190
0	8,252	53,48			0,317	150
1	7,348	42,41		375	1,40	120
2	6,544	33,63		295	1,50	96
3	5,827	26,67		237	1,63	78
4	5,189	21,15		188	0,80	60
5	4,621	16,77		149	1,01	48
6	4,115	13,30		118	1,27	38
7	3,665	10,55		94	1,70	30
8	3,264	8,36		74	2,03	24
9	2,906	6,63		58,9	2,56	19
10	2,588	5,26		46,8	3,23	15
11	2,305	4,17		32,1	4,07	12
12	2,053	3,31		29,4	5,13	9,5
13	1,828	2,63		23,3	6,49	7,5
14	1,628	2,08	5,6	18,5	8,17	6,0
15	1,450	1,65	6,4	14,7	10,3	4,8
16	1,291	1,31	7,2	11,6	12,9	3,7
17	1,150	1,04	8,4	9,26	16,34	3,2
18	1,024	0,82	9,2	7,3	20,73	2,5
19	0,9116	0,65	10,2	5,79	26,15	2,0
20	0,8118	0,52	11,6	4,61	32,69	1,6
21	0,7230	0,41	12,8	3,64	41,46	1,2
22	0,6438	0,33	14,4	2,89	51,5	0,92
23	0,5733	0,26	16,0	2,29	56,4	0,73
24	0,5106	0,20	18,0	1,82	85,0	0,58
25	0,4547	0,16	20,0	1,44	106,2	0,46

Ley de Ohm

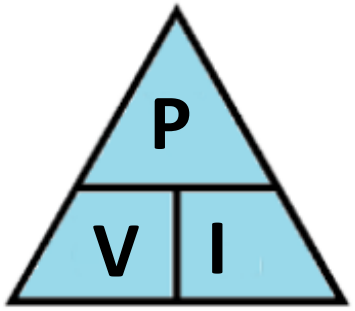


V = I x R

R = V / I

I = V / R

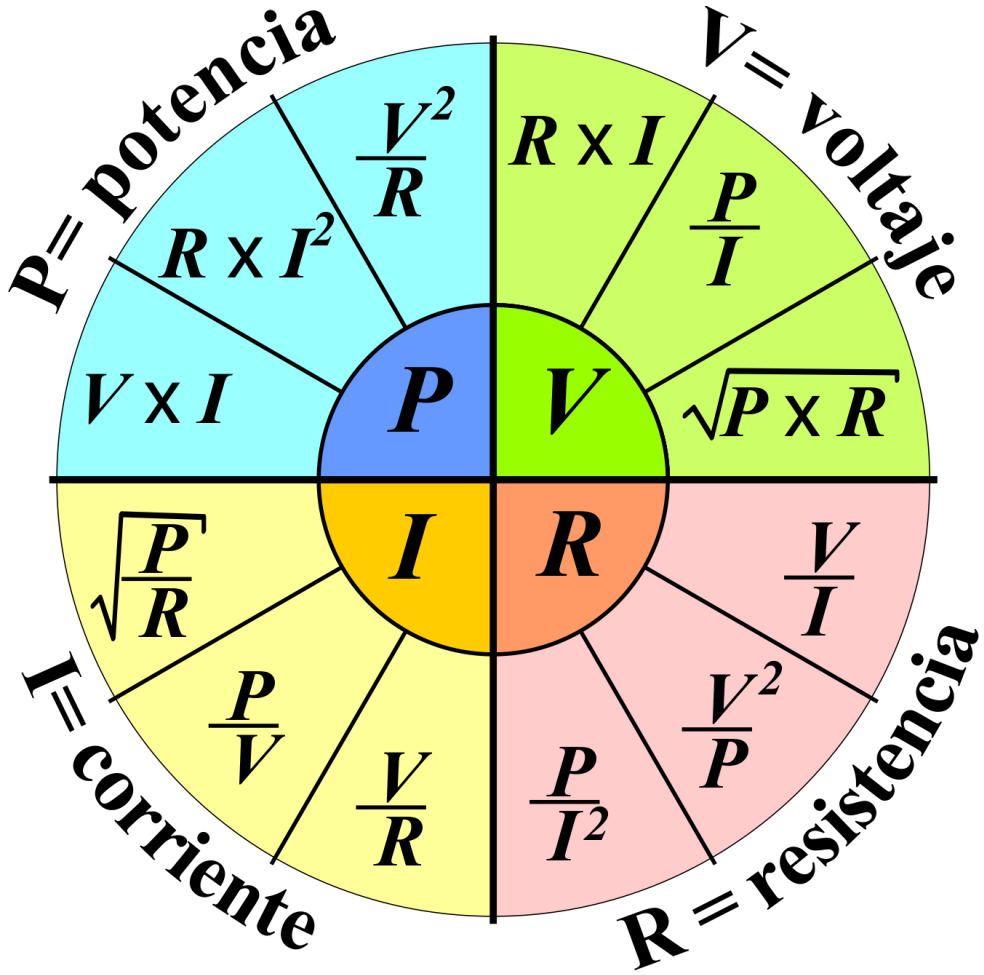
Ley de Potencias



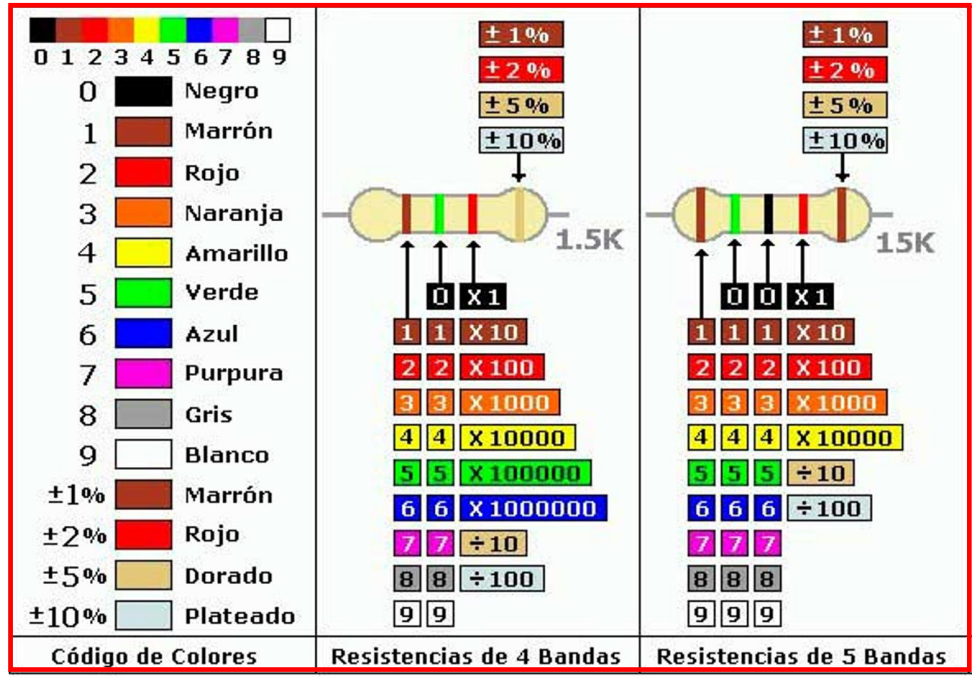
P = V x I

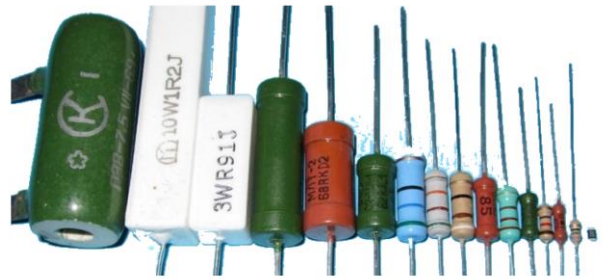
V = P / I

I = P / V



RESISTENCIAS THROUGH HOLE



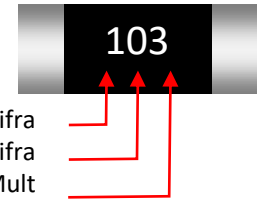


TIPOS DE RESISTENCIAS ELECTRICAS

- Película de carbon (llega a los 2 vatios)
- Película de óxido metálico (óxido metálico, latón o estaño)
- Hilo bobinado - Nicrom

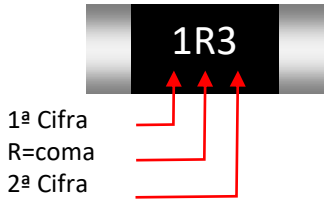
RESISTENCIAS SMD

RESISTENCIAS SMD Con 3 dígitos



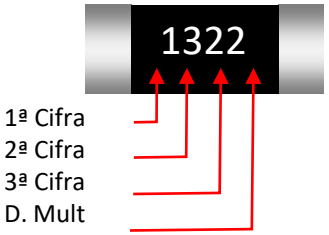
100	1-0-_ = 10Ω
172	1-7-00 = 1700Ω
334	3-3-0000 = 330000Ω

RESISTENCIAS SMD Con 3 dígitos Menores a 10Ω



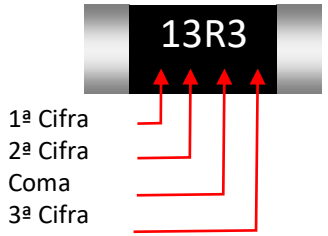
R10	,1 = 0,1Ω
R22	,22 = 0,22Ω
1R7	1,7 = 1,7Ω

RESISTENCIAS SMD Con 4 dígitos



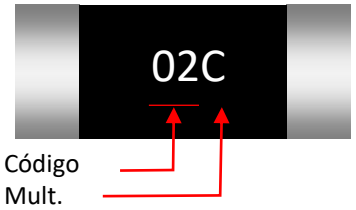
1000	1-0-0-_ = 100Ω
3300	3-3-3-_ = 330Ω
4703	4-7-0-000 = 470KΩ

RESISTENCIAS SMD Con 4 dígitos Menores a 100Ω



0R47	0-,-4-7 = 0,47Ω
1R20	1-,-2-0 = 1,20Ω
47R0	4-7-,-0 = 47Ω

RESISTENCIAS SMD CON CÓDIGO EIA-96

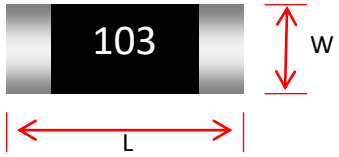


CODIGO	MULTIPLICADOR
Z	0.001
Y or R	0.01
X or S	0.1
A	1
B or H	10
C	100
D	1000
E	10000
F	100000

12X	130 X 0,1 = 13Ω
30C	200 X 100 = 20KΩ
58D	392 X 1000 = 392KΩ

Cod	Valor	Cod	Valor	Cod	Valor	Cod	Valor
01	100	25	178	49	316	73	562
02	102	26	182	50	324	74	576
03	105	27	187	51	332	75	590
04	107	28	191	52	340	76	604
05	110	29	196	53	348	77	619
06	113	30	200	54	357	78	634
07	115	31	205	55	365	79	649
08	118	32	210	56	374	80	665
09	121	33	215	57	383	81	681
10	124	34	221	58	392	82	698
11	127	35	226	59	402	83	715
12	130	36	232	60	412	84	732
13	133	37	237	61	422	85	750
14	137	38	243	62	432	86	768
15	140	39	249	63	442	87	787
16	143	40	255	64	453	88	806
17	147	41	261	65	464	89	825
18	150	42	267	66	475	90	845
19	154	43	274	67	487	91	866
20	158	44	280	68	499	92	887
21	162	45	287	69	511	93	909
22	165	46	294	70	523	94	931
23	169	47	301	71	536	95	953
24	174	48	309	72	549	96	976

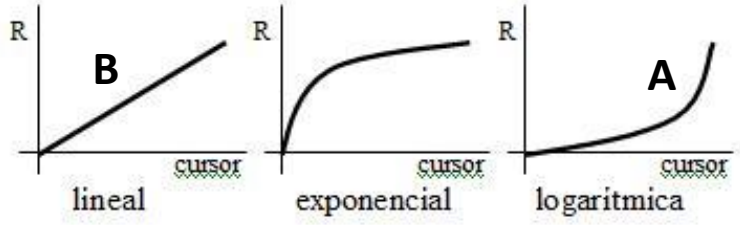
DIMENSIONES Y POTENCIAS

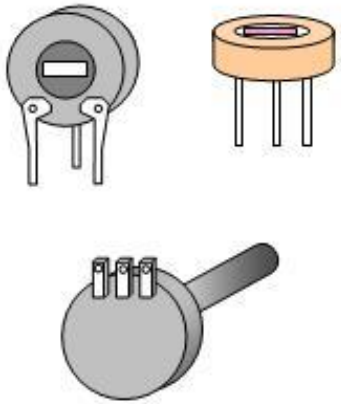


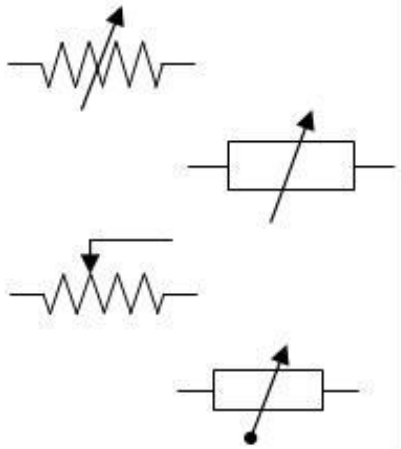
ENCAPSULADO	DIMENSIONES (L X W)	POTENCIA
0201	0.6 mm × 0.3 mm	1/20W
0402	1.0 mm × 0.5 mm	1/16W
0603	1.6 mm × 0.8 mm	1/16W
0805	2.0 mm × 1.25 mm	1/10W
1206	3.2 mm × 1.6 mm	1/8W
1210	3.2 mm × 2.5 mm	1/4W
1812	4.5 mm x 3.2 mm	1/3W
2010	5.0 mm × 2.5 mm	1/2W
2512	6.35 mm × 3.2 mm	1W

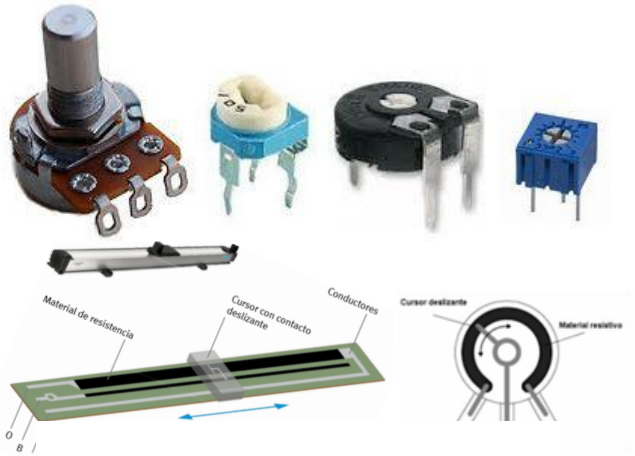
Las **RESISTENCIAS AJUSTABLES o POTENCIÓMETROS** pueden graduarse desde cero hasta su máxima resistencia girando la ranura central dispuesta en el propio componente.

La resistencia puede variar de forma:

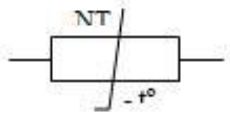




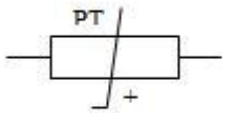




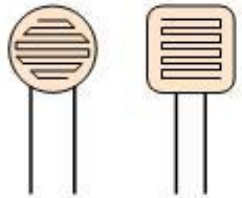
La resistencia **NTC** (Coeficiente Negativo de Temperatura) ofrece una resistencia que depende de la temperatura a la que se encuentre: disminuye su resistencia al aumentar la temperatura.

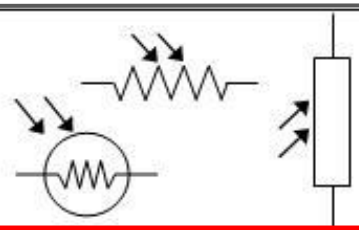


La resistencia **PTC** (Coeficiente Positivo de Temperatura) ofrece una resistencia que depende de la temperatura a la que se encuentre: aumenta su resistencia al aumentar la temperatura.



La resistencia **LDR** (Resistencia Dependiente de la Luz), o foto-resistencia, ofrece una resistencia que depende de la luz que incide sobre ella: disminuyendo su resistencia al aumentar la luminosidad.





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