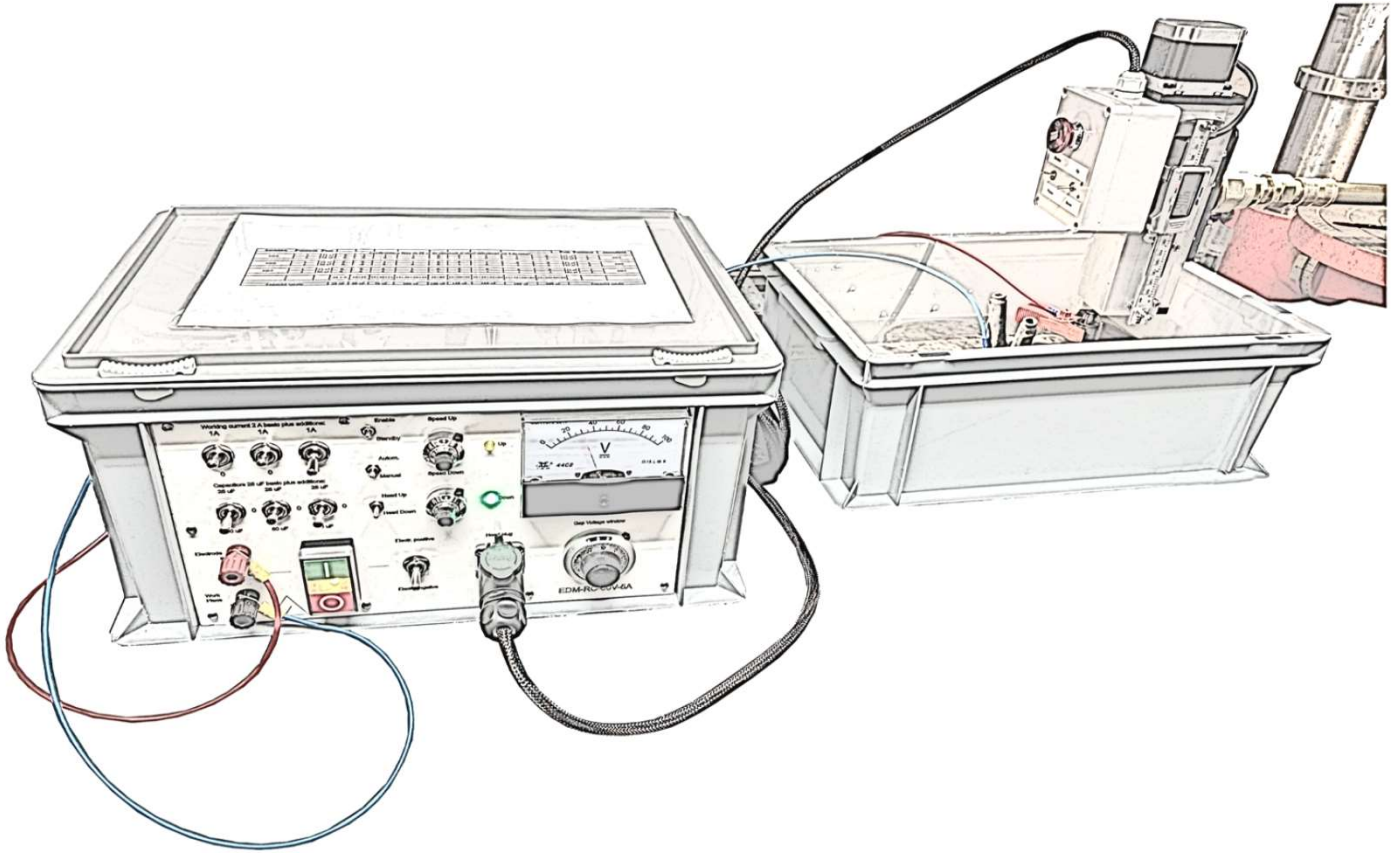
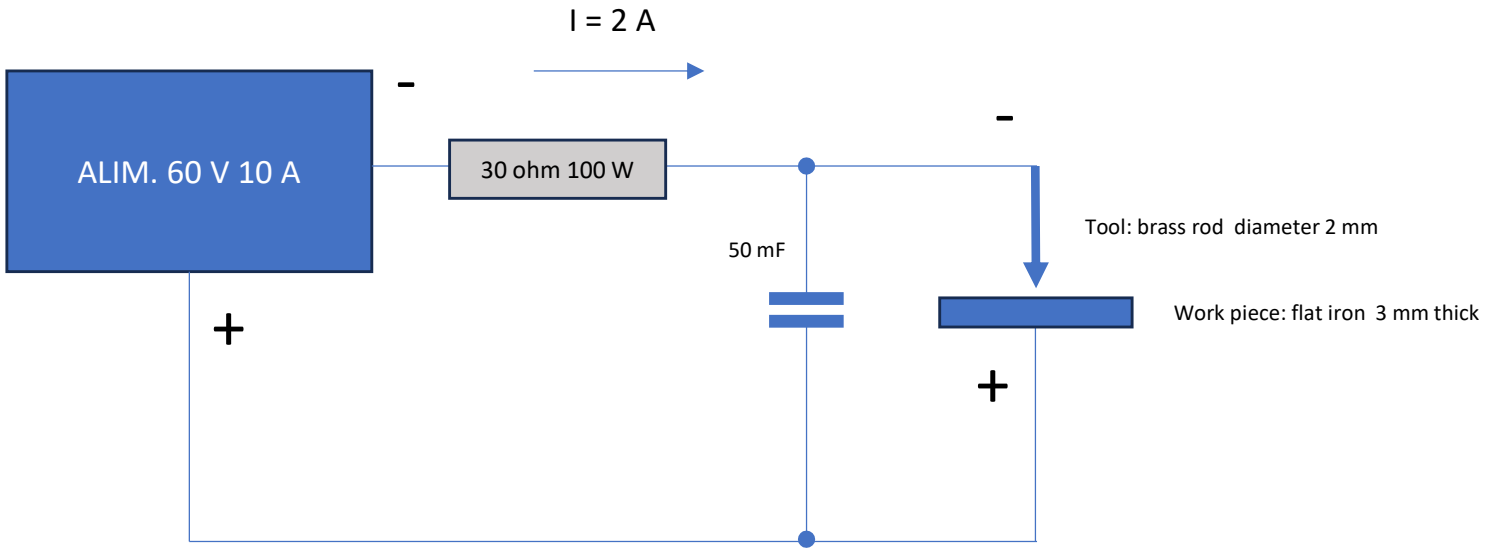
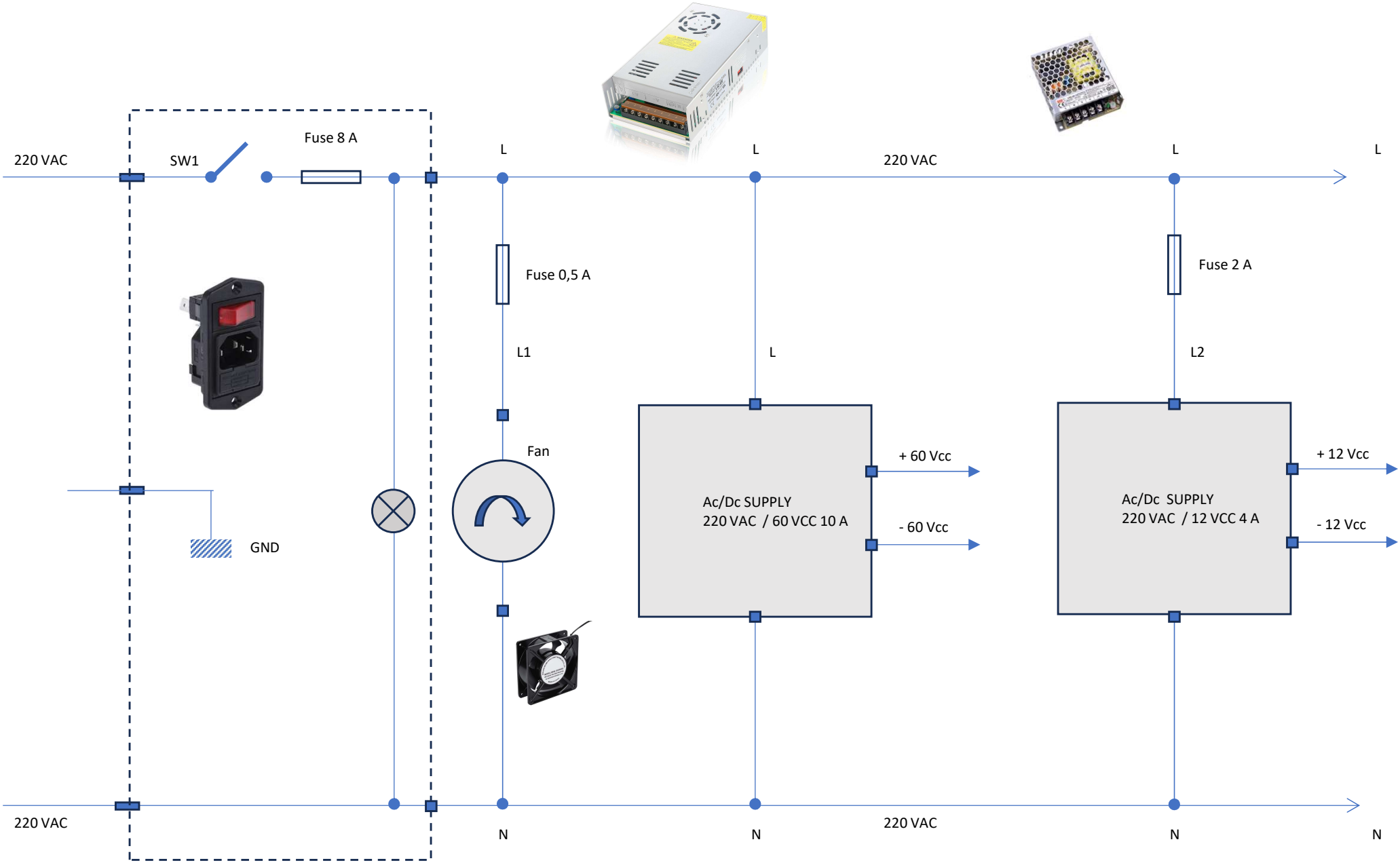
EDM-RC-60V-5A
die-sink electrical discharge machining system
schematics



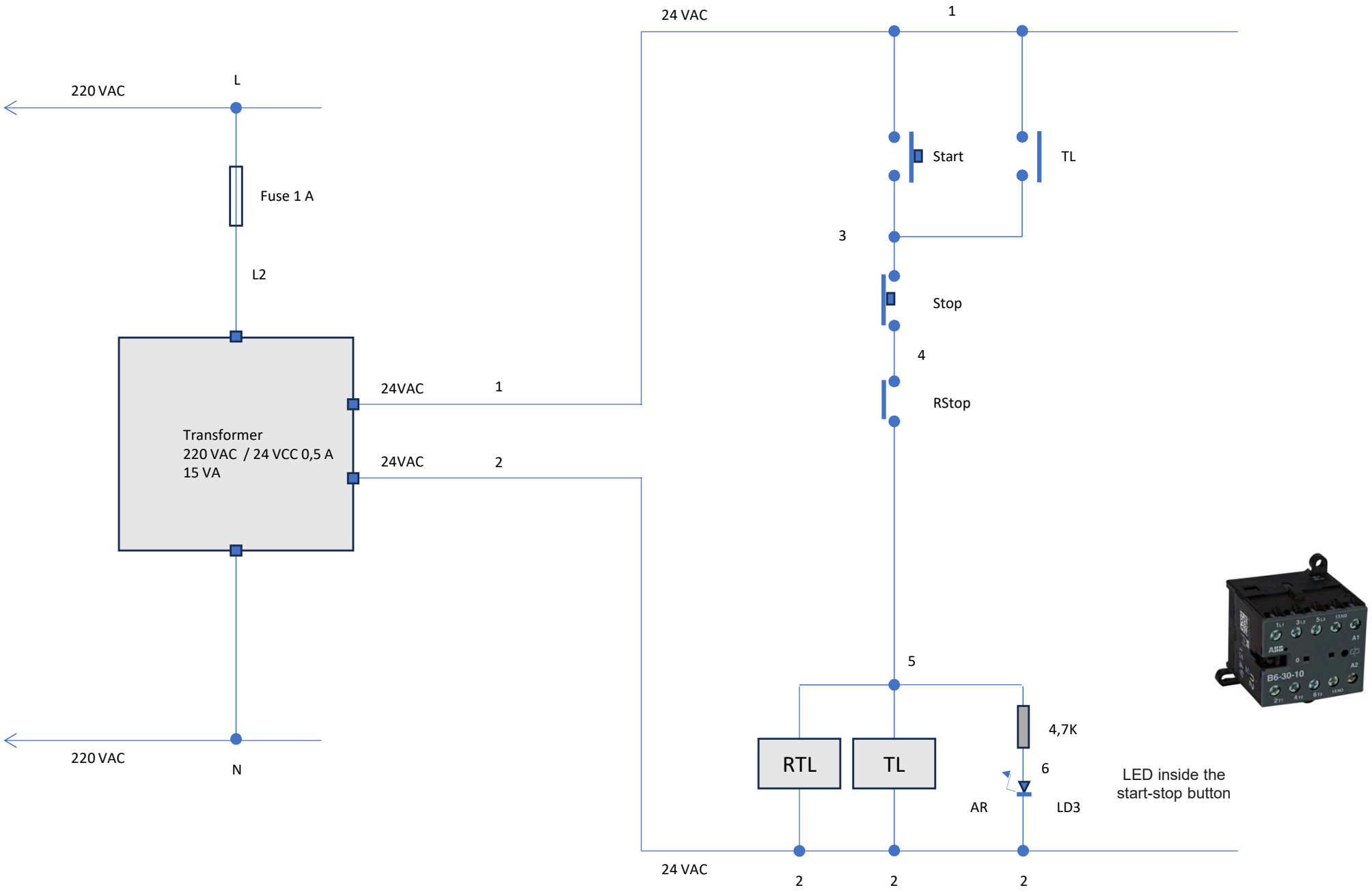
PRELIMINARY TEST:
With the parameters as per the diagram, the drilling time was 20 minutes.
Water from the aqueduct was used as the dielectric.
The test was carried out using a column drill to the spindle
on which the tool was mounted. The type of advancement
was made manually using The lowering lever of the drill itself.



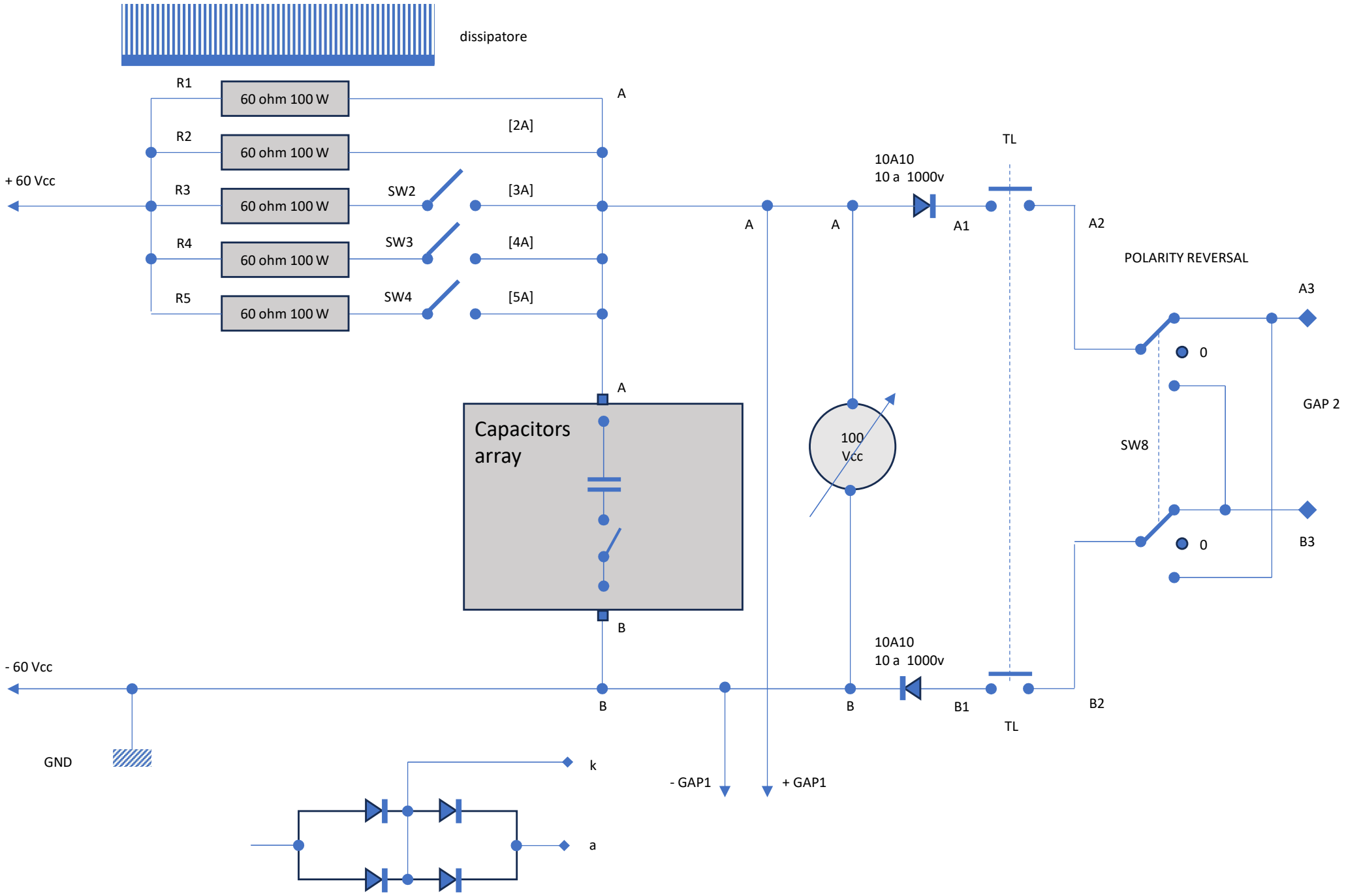


12/12/2024

SUPPLY CIRCUIT



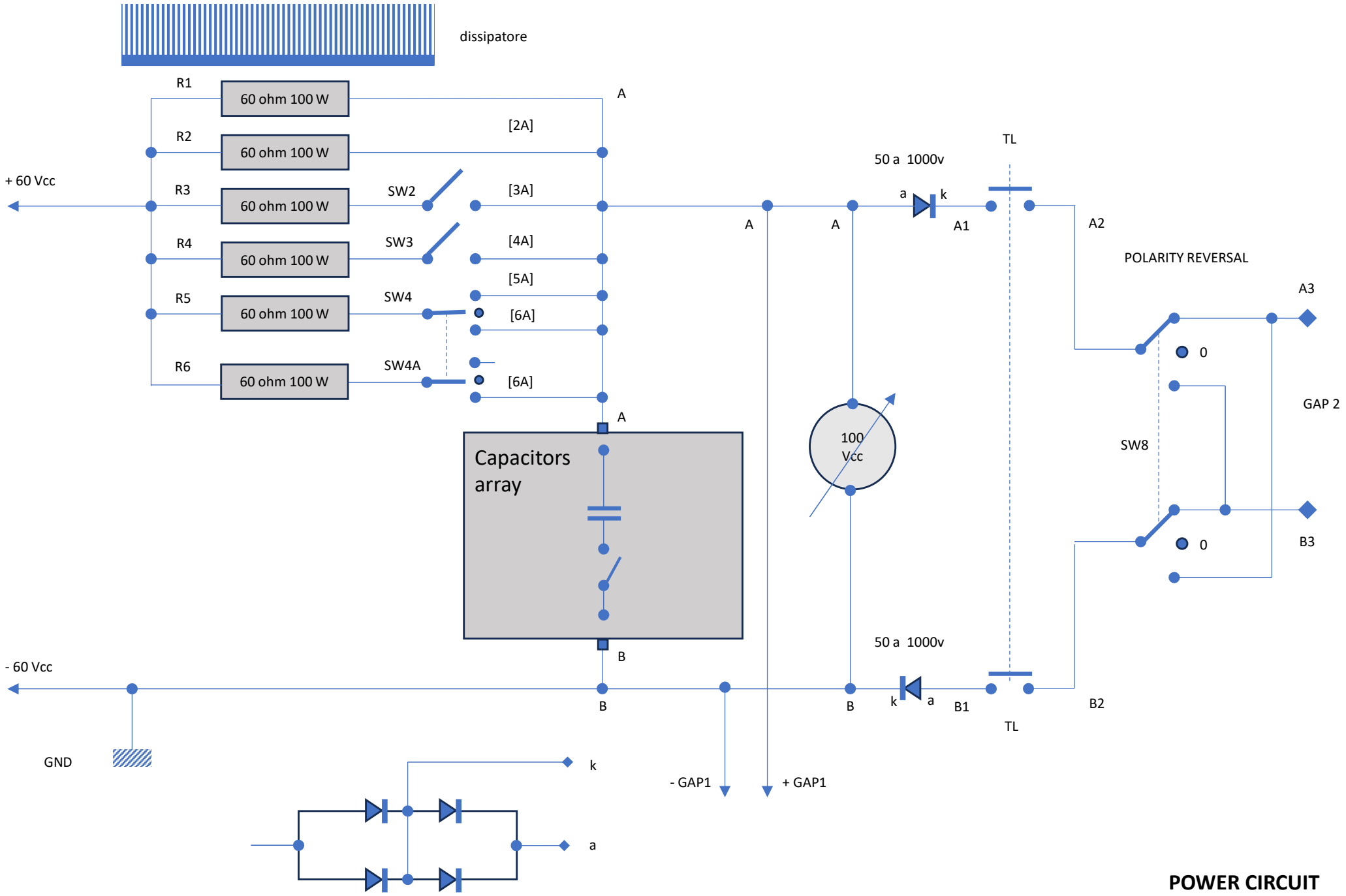
Electrode power supply control contactor



The power diodes were obtained using half of two bridges Rectifiers as shown above.

12/12/2024

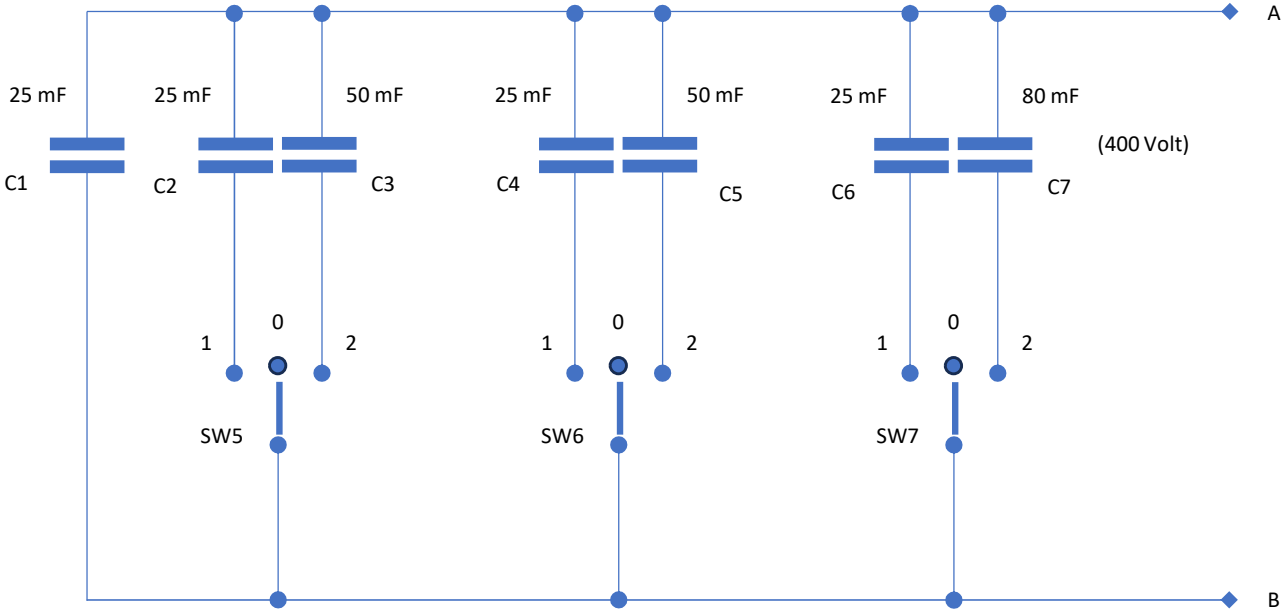
POWER CIRCUIT



The power diodes were obtained using half of two bridges Rectifiers as shown above.

12/12/2024

POWER CIRCUIT
VARIANT 6 Ampere

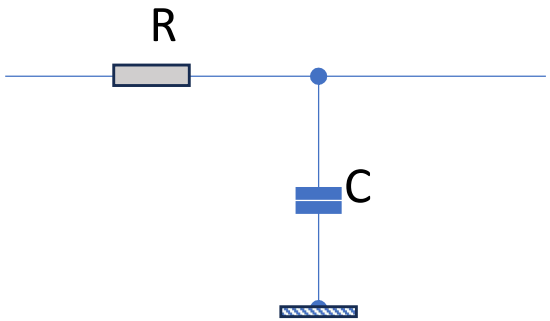


Capacitors array:
C min. 25 mF
C max 205 mF

Capacitors	25 mF 400 V	nr 4
Capacitors	50 mF 400 V	nr 2
Capacitor	80 mF 400 V	nr 1

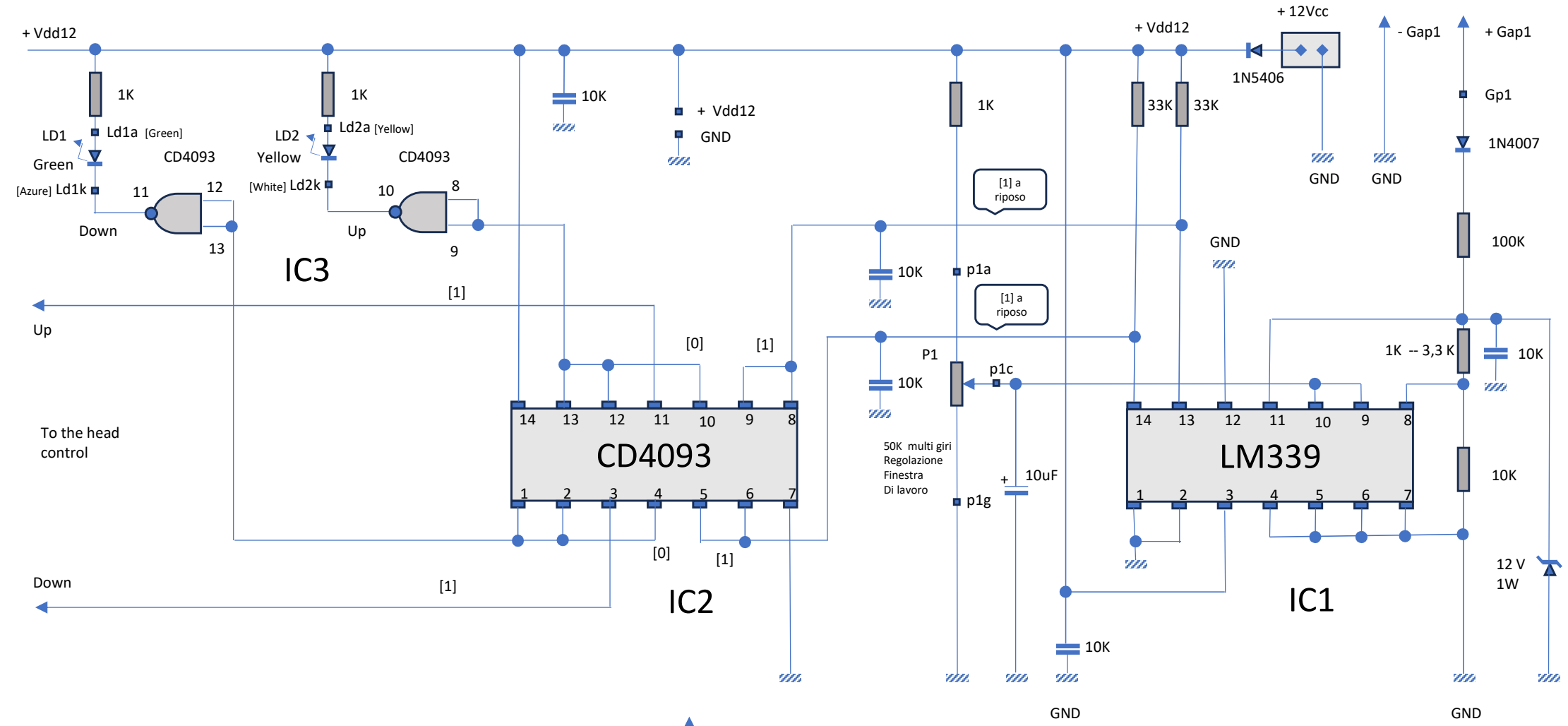
Switch	Position	weight										weight	Position	switch
25 uF base capacity to be added to the values selected by the 3 switches														
SW5	1	25 uF	0	1	1	1	0	0	1	1	0	25 uF	1	SW5
	2	50 uF	0	0	0	0	0	1	0	0	1	50 uF	2	
SW6	1	25 uF	0	0	1	1	0	0	1	0	0	25 uF	1	SW6
	2	50 uF	0	0	0	0	0	1	0	1	1	50 uF	2	
SW7	1	25 uF	0	0	0	1	0	0	0	0	0	25 uF	1	SW7
	2	80 uF	0	0	0	0	1	0	1	1	1	80 uF	2	
			25 + 0	25+25	25+25+25	25+25+25+25	25+80	25+50+50	25+25+25+80	25+25+50+80	25+50+50+80			
Total capacity			25 uF	50 uF	75 uF	100 uF	105 uF	125 uF	155 uF	180 uF	205 uF	Total capacity		

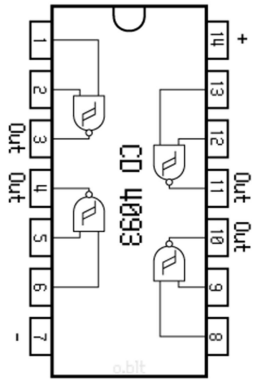
Capacitors array



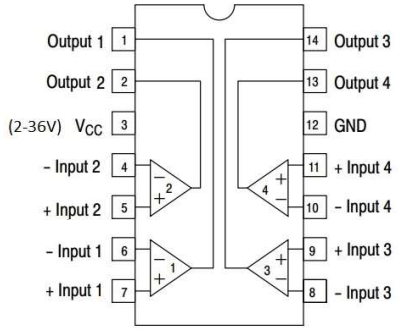
Current Ampere	Capacitance uF	Resistence Ohm	R*C in seconds	Frequency Hz	Energy 1/2 (C *V ²)/10E-6 Joule at 60 V	Energy 1/2 (C *V ²) /10E-6 Joule at 30 V
2	25	30	0,00075	1333	0,05	0,01
2	50	30	0,0015	667	0,09	0,02
2	75	30	0,00225	444	0,14	0,03
2	100	30	0,003	333	0,18	0,05
2	105	30	0,00315	317	0,19	0,05
2	125	30	0,00375	267	0,23	0,06
2	155	30	0,00465	215	0,28	0,07
2	180	30	0,0054	185	0,32	0,08
2	205	30	0,00615	163	0,37	0,09
3	25	20	0,0005	2000	0,05	0,01
3	50	20	0,001	1000	0,09	0,02
3	75	20	0,0015	667	0,14	0,03
3	100	20	0,002	500	0,18	0,05
3	105	20	0,0021	476	0,19	0,05
3	125	20	0,0025	400	0,23	0,06
3	155	20	0,0031	323	0,28	0,07
3	180	20	0,0036	278	0,32	0,08
3	205	20	0,0041	244	0,37	0,09
4	25	15	0,000375	2667	0,05	0,01
4	50	15	0,00075	1333	0,09	0,02
4	75	15	0,001125	889	0,14	0,03
4	100	15	0,0015	667	0,18	0,05
4	105	15	0,001575	635	0,19	0,05
4	125	15	0,001875	533	0,23	0,06
4	155	15	0,002325	430	0,28	0,07
4	180	15	0,0027	370	0,32	0,08
4	205	15	0,003075	325	0,37	0,09
5	25	12	0,0003	3333	0,05	0,01
5	50	12	0,0006	1667	0,09	0,02
5	75	12	0,0009	1111	0,14	0,03
5	100	12	0,0012	833	0,18	0,05
5	105	12	0,00126	794	0,19	0,05
5	125	12	0,0015	667	0,23	0,06
5	155	12	0,00186	538	0,28	0,07
5	180	12	0,00216	463	0,32	0,08
5	205	12	0,00246	407	0,37	0,09

RC parameters

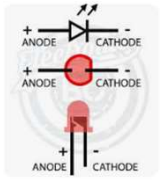


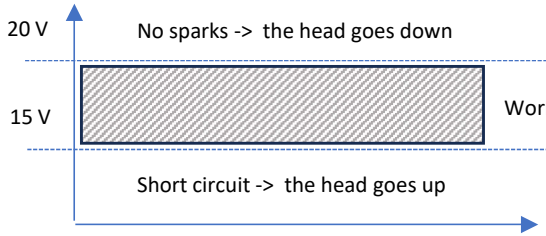


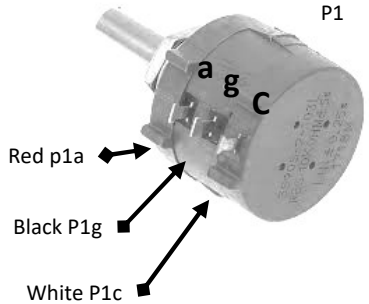
LM339
Quad Comparator



(Top View)







12/12/2024

WINDOW COMPARATOR
For GAP voltage monitoring

If SW8 is in automatic position And the TL contactor is Off,
the TB6600 must be in STBY

+ Vdd12

10K

+ Vcc

GND

6,8K

STEPPER MOTOR

RED A+ GRN A- BLU B+ YEL B-

+ Vcc12

cam4

SW8/4

REN

en1

a4

en1

RTL

Max Up

Max Down

RFcH

RFcL

h1

L1

1K

1K

1K

10K

10K

Up - down Automatic

SpUp

CD40893

SW8/1

a1

Up

[1]

10K

cam1

m1

1uF

IC3

CD4071

SW8/2

a2

[1]

Down

10K

cam2

m2

Manual

SpDown

CD4071

1uF

Choice of direction of rotation of the step motor, of Pin 1 or Pin 2 the CD4093

IC4

A

To the head Speed control

ICM 555

IC6

B

33K

10K

CD4016

IC5

6

1 KHZ

1K

A + A - B + B - + Vcc [Azure] En +

With En+ set to the logical state 1, The controller is in stand by mode

Pul + [Green]

TB6600

Dir + [Yellow]

En - Dir - GND Pul -

1K

1N4148

CD4071

GND

1K

CD4071

[STBY when power goes on]

+ 12 Vcc

10uF

10uF

330K

1N4148

10K

u1

d1

Up

Down

R-up

R-down

Head control

4071

4016

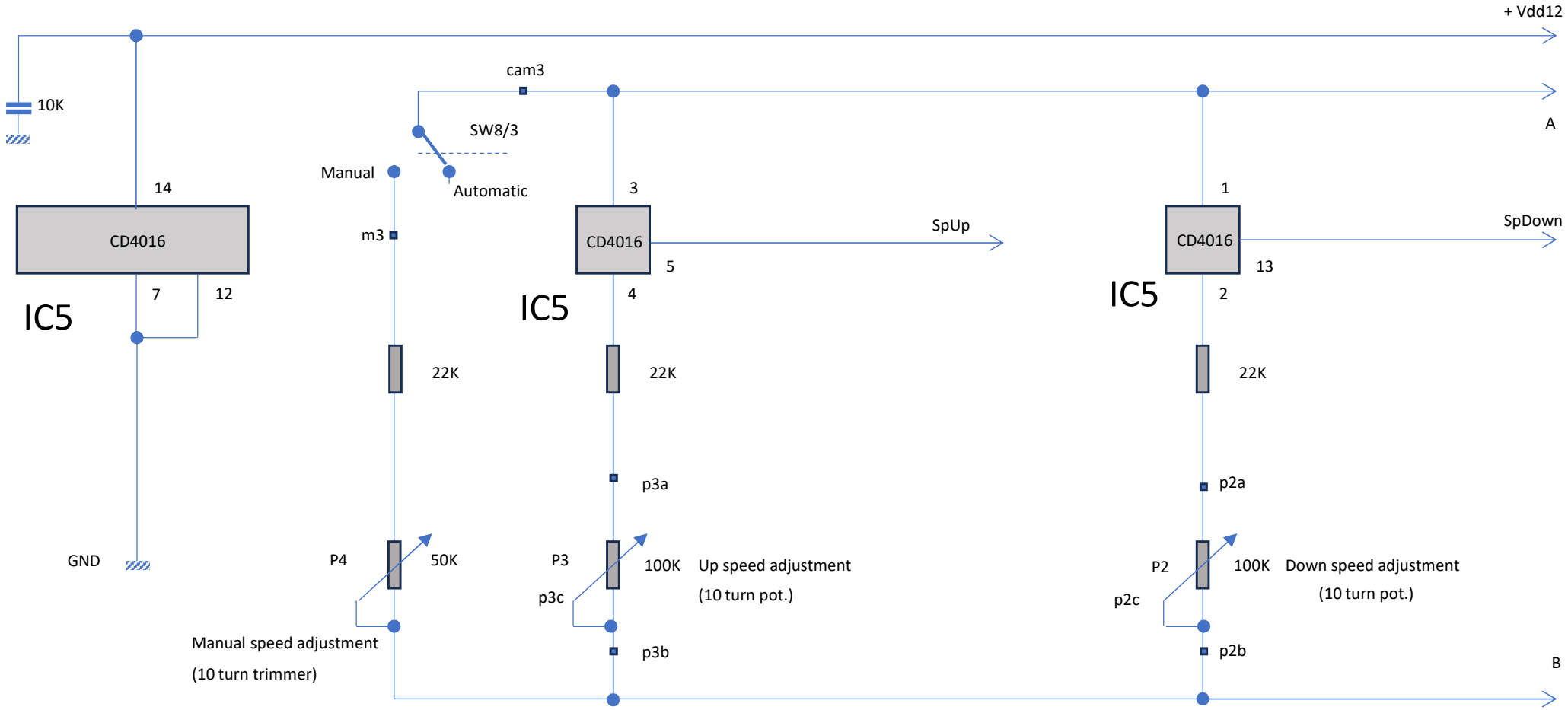
4093

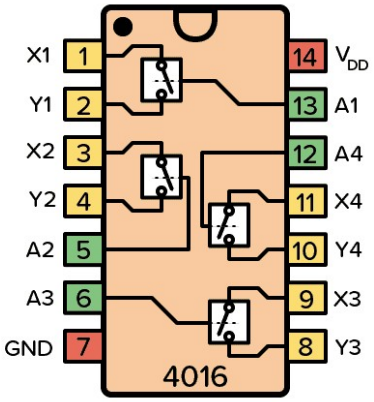
BC337

Collector (1)

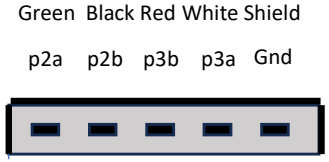
Emitter (3)

Base (2)

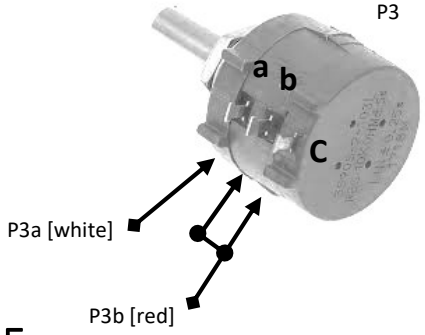




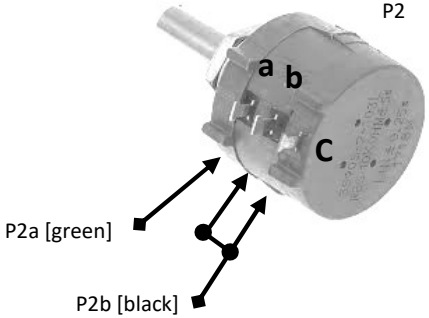
PT2-3



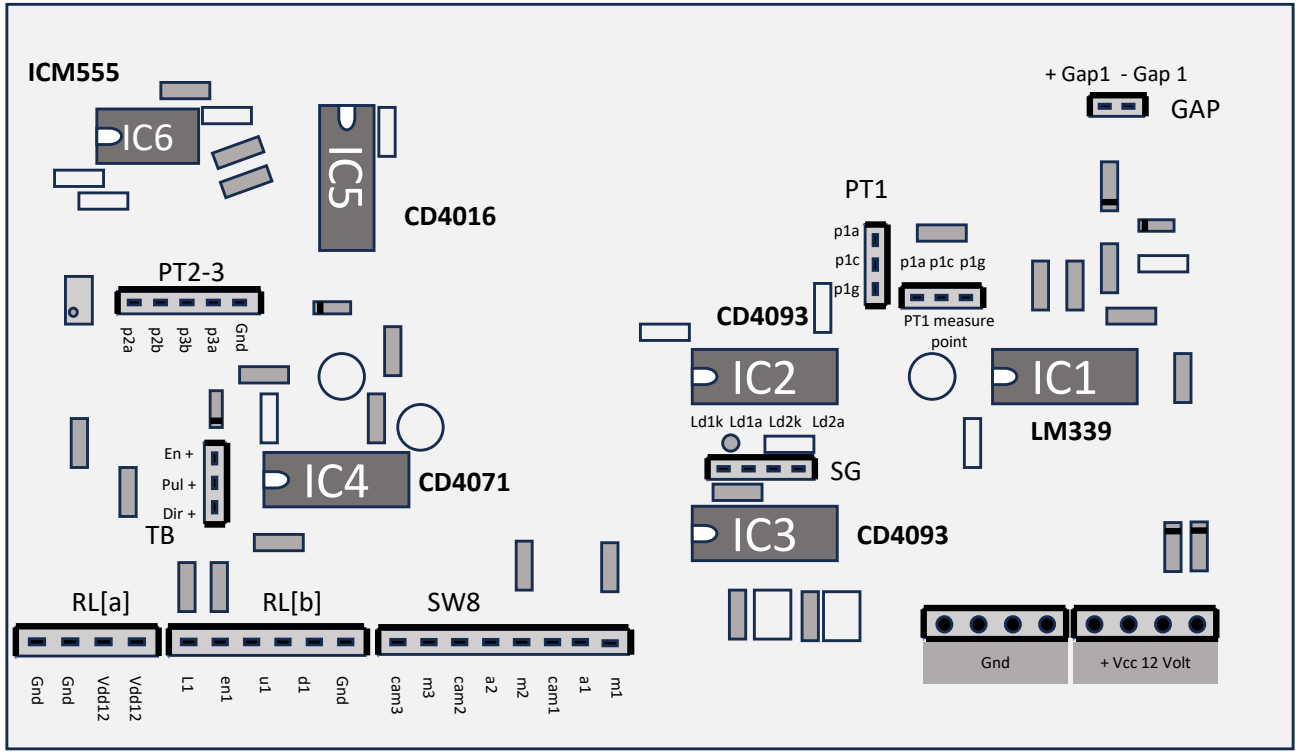
Conn. Potenziometri
555



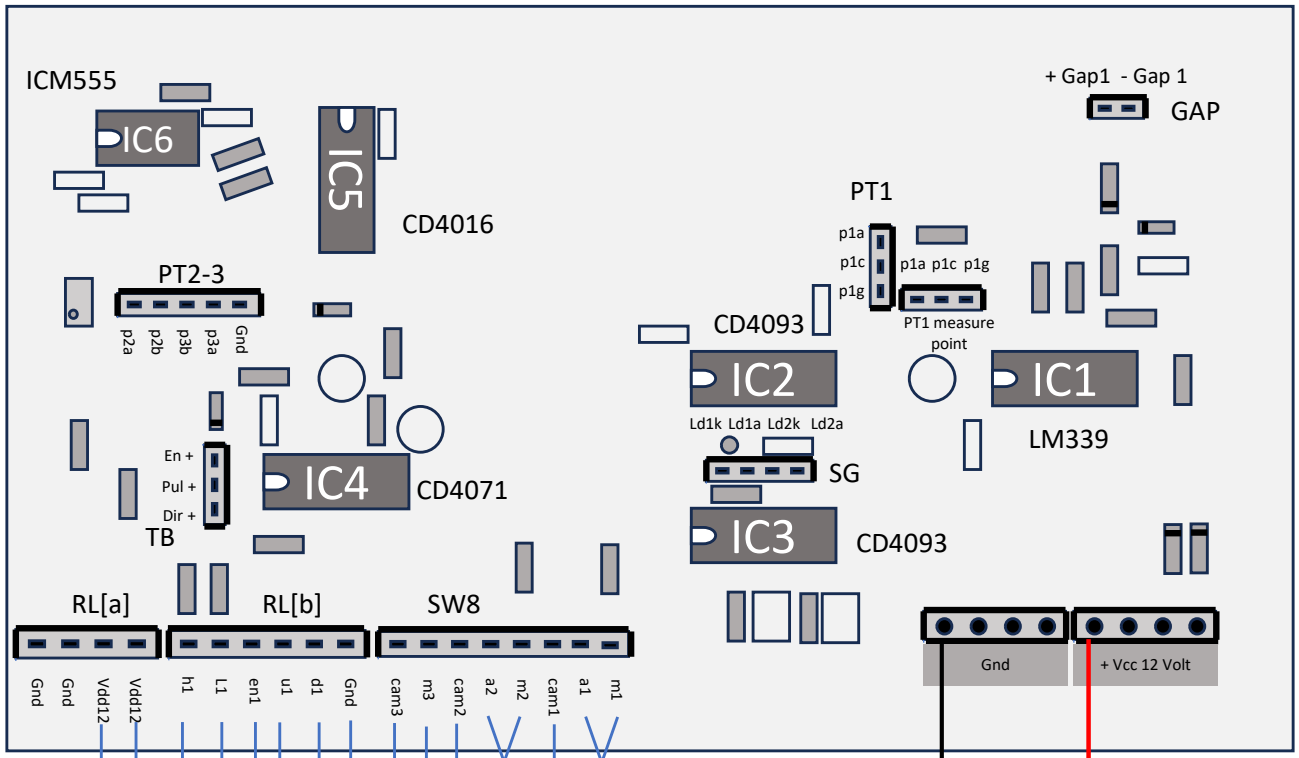
5



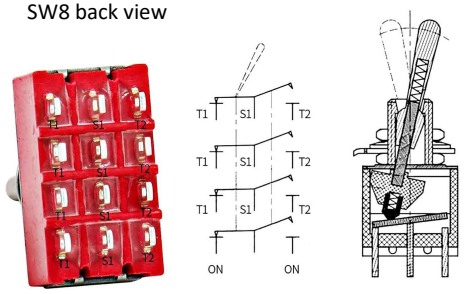
HEAD SPEED CONTROL



Layout control board



SW8 back view



SW8/1	cam1	Gray
	a1	Pink
	m1	White
SW8/2	cam2	Brown
	a2	Orange
	m2	Purple
SW8/3	cam3	Yellow
	/	/
	m3	Blu
SW8/4	cam4	Red
	a4	Green

Connections of switches and relays to the control board

SW8

Yellow Blu Brown Orange Purple Gray Pink White

cam3 m3 cam2 a2 m2 cam1 a1 m1

Conn. switch SW8
JST XHPX-8

RLb

Orange Pink Purple Gray White

h1 L1 en1 u1 d1 Gnd

Conn. Relays [b]
JST XHPX-6

wire color	function
Orange	FcH ->h1
Pink	FcL -> L1
Purple	SwEn -> en1
Gray	SwUp -> u1
White	SwDown -> d1
Black	GND

RLa

Gnd Gnd Vdd12 Vdd12

Conn. Relays [a]
JST XHPX-4

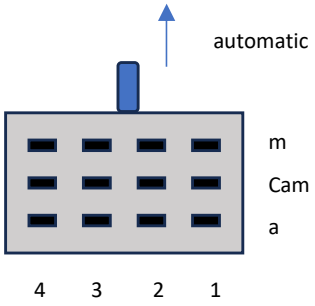
TB

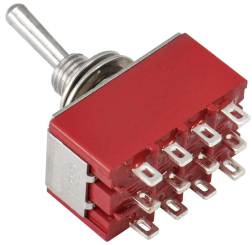
Azure Green Yellow

En + Pul + Dir +

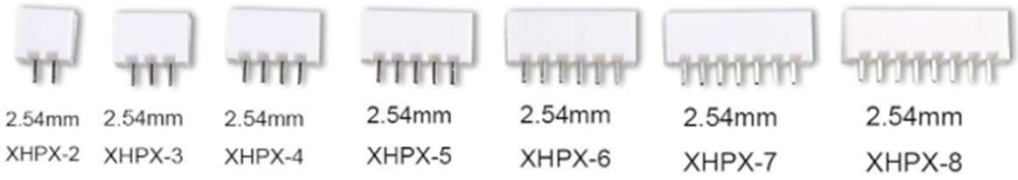
Conn. TB6600
JST XHPX-3

SW8 back view





SW8/1	cam1	Grey
	a1	Pink
	m1	White
SW8/2	cam2	Brown
	a2	Orange
	m2	Purple
SW8/3	cam3	Yellow
	/	/
	m3	Blu
SW8/4	cam4	Red
	a4	Green



PT1

Red White Black + shield

p1a p1c p1g

Conn. Potentiometer
GAP window
JST XHPX-3

PT2-3

Green Black Red White Shiels

p2a p2b p3b p3a Gnd

Conn. Potentiometers
555
JST XHPX-5

SG

Azure Green White Yellow

Ld1k Ld1a Ld2k Ld2a

Conn. Signals Led
JST XHPX-4

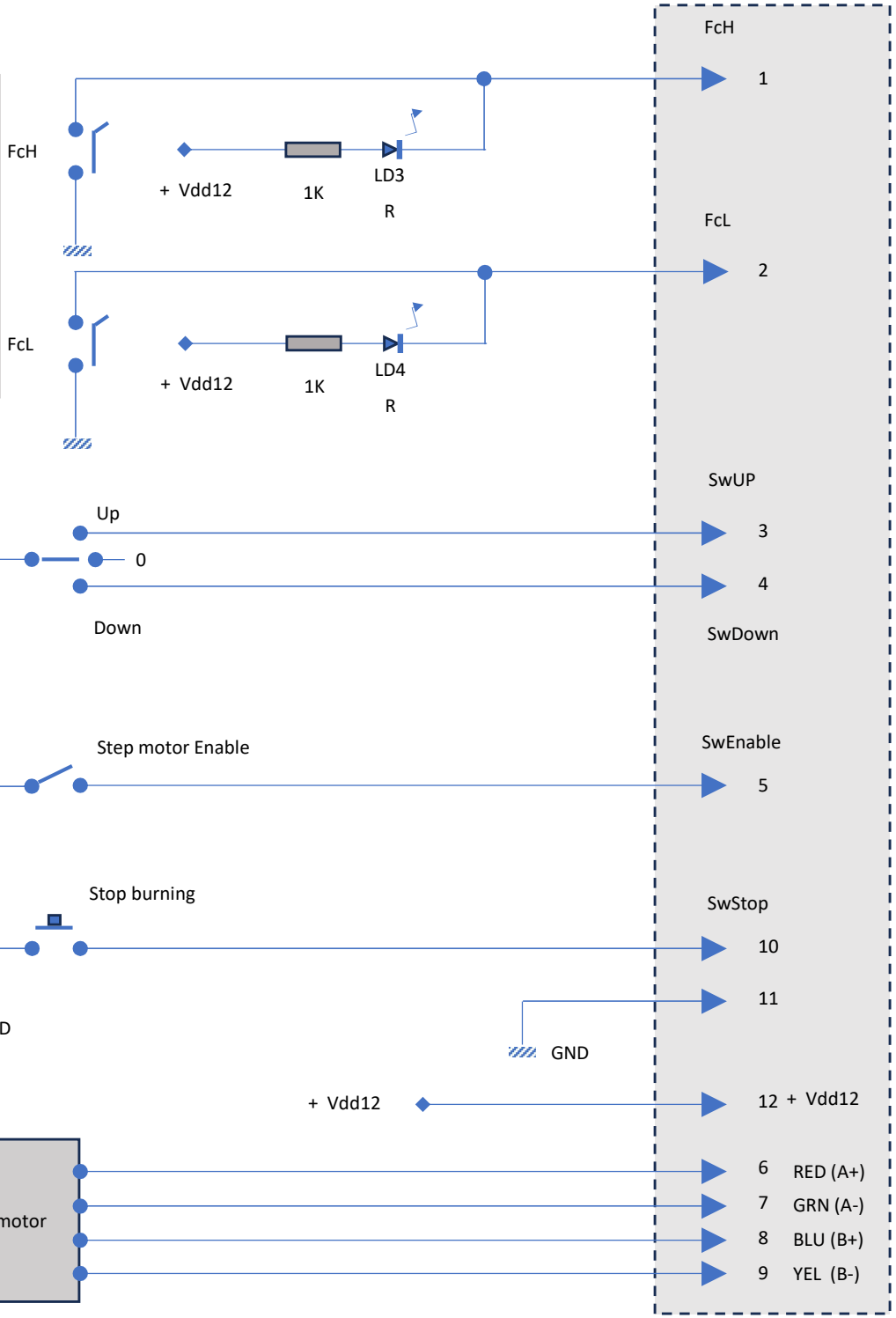
GAP

+ Gap1 - Gap1

Conn. Ingresso
tensione GAP
JST XHPX-2

JST connectors on control board

3	Gray	SwUp
4	White	SwDown
5	Purple	SwEn
6	Red	Stepper motor A+
7	Green	Stepper motor A-
8	Blue	Stepper motor B-
9	Yellow	Stepper motor B+
10	Brown	SwStop
11	Black	Gnd
12	Azure	Positive Vdd12



Head Plug

RFcH (CH1)

RFcL (CH2)

R Up (CH3)

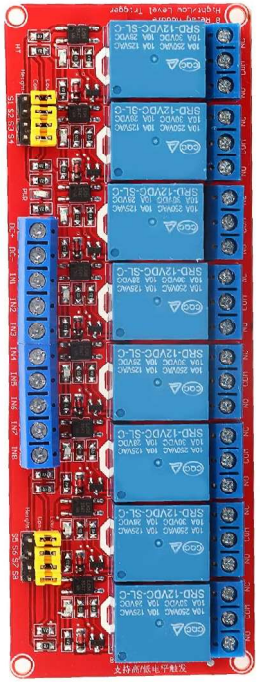
R Down (CH4)

R EN (CH5)

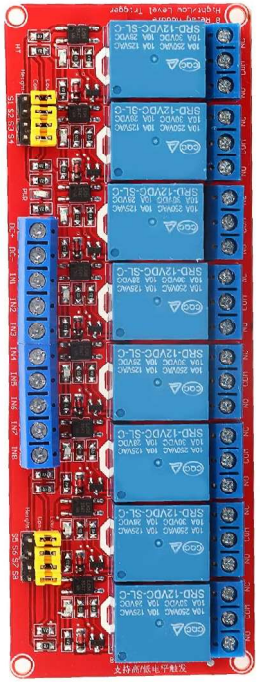
R Stop (CH6)

(CH7) Unused

(CH8) Unused



Motorized Head wiring



3	Gray	SwUp
4	White	SwDown
5	Purple	SwEn
6	Red	Stepper motor A+
7	Green	Stepper motor A-
8	Blue	Stepper motor B-
9	Yellow	Stepper motor B+
10	Brown	SwStop
11	Black	Gnd
12	Azure	Positive Vdd12

Motorized Head Wiring :
Connectors and wirings

Stepper Motor 200 step/t.

Progress/step:
5 mm/200 = 0,025 mm

Driver settings1/16 step
Final resolution0,025 / 16 = 0,00156 mm

Stepper motor

Up

SW10

(Red)

LD3

White [4]

Gray [3]

LD4

(Red)

Down

SW11

Purple [5]

SW12

Brown [10]

FcL

FcH

Connection cable
12 * 0,25 mmq

N.O. Reed switch

Stepper motor

Red [6]
Green [7]
Blu [8]
Yel [9]
Azure [12]
Black [11]

A+
A-
B+
B-

+ Vdd12

GND

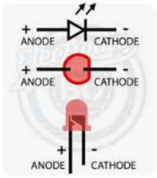
Com. SW10
SW11
SW12
FcL
FcH

1K
1K

Pink [2]
Orange [1]

A LD4
A LD3

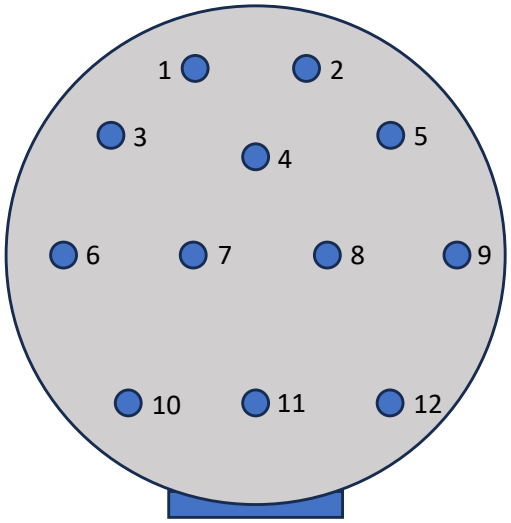
FcL
FcH



K LD3 (FcH)

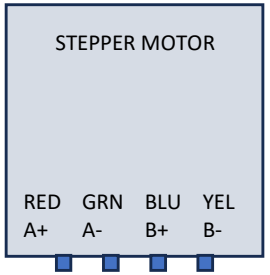
K LD4 (FcL)

Motorized Head wiring: Switches and limit sw.

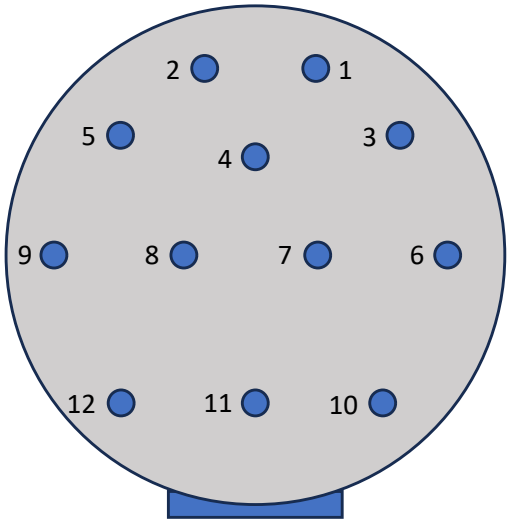


Front panel socket
Front view

Pin	Cable color	function	
1	Orange	FcH	
2	Pink	FcL	
3	Gray	SwUp	
4	White	SwDown	
5	Purple	SwEn	
6	Red	Stepper motor A+	
7	Green	Stepper motor A-	
8	Blu	Stepper motor B-	
9	Yellow	Stepper motor B+	
10	Brown	SwStop	
11	Black	Gnd	
12	Azure	Positive Vdd12	

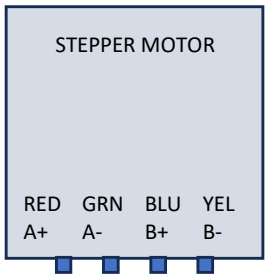


Socket wiring for head signals
And supply

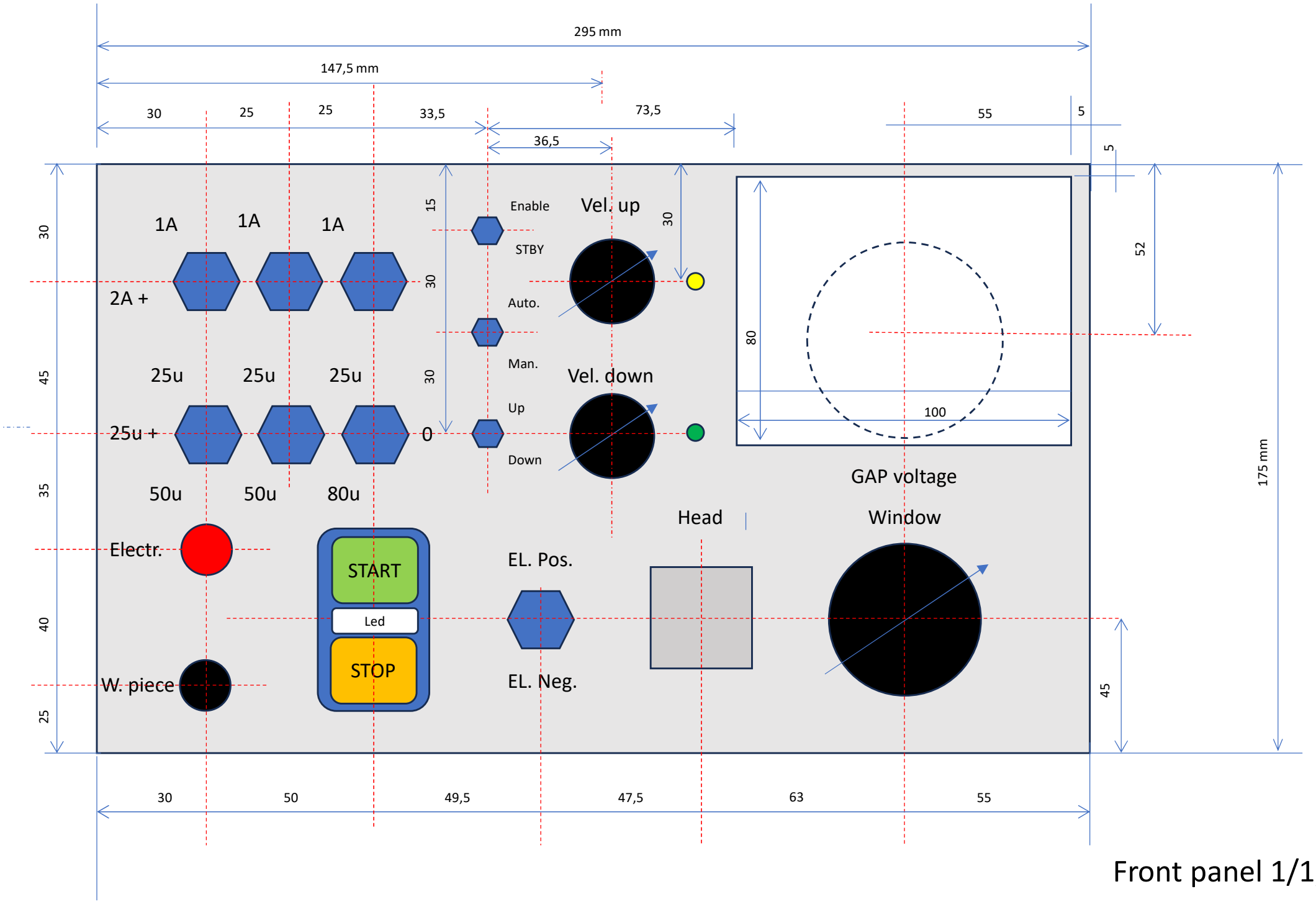


Front panel socket
Back view

Pin	Cable color	function	
1	Orange	FcH	
2	Pink	FcL	
3	Gray	SwUp	
4	White	SwDown	
5	Purple	SwEn	
6	Red	Stepper motor A+	
7	Green	Stepper motor A-	
8	Blu	Stepper motor B-	
9	Yellow	Stepper motor B+	
10	Brown	SwStop	
11	Black	Gnd	
12	Azure	Positive Vdd12	

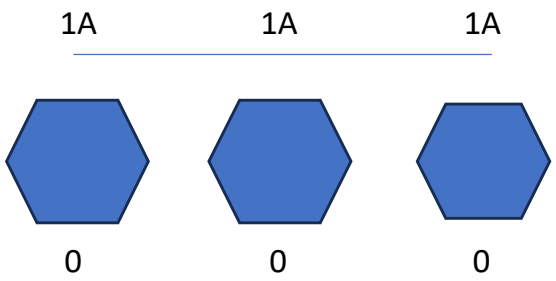


Socket wiring for head signals
And supply

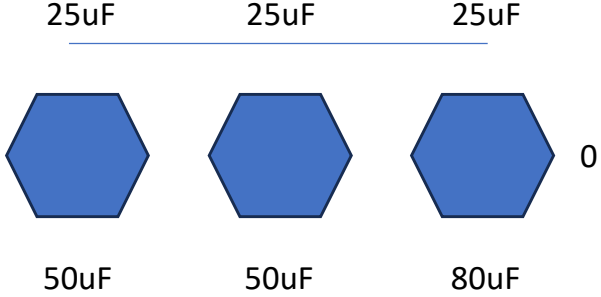


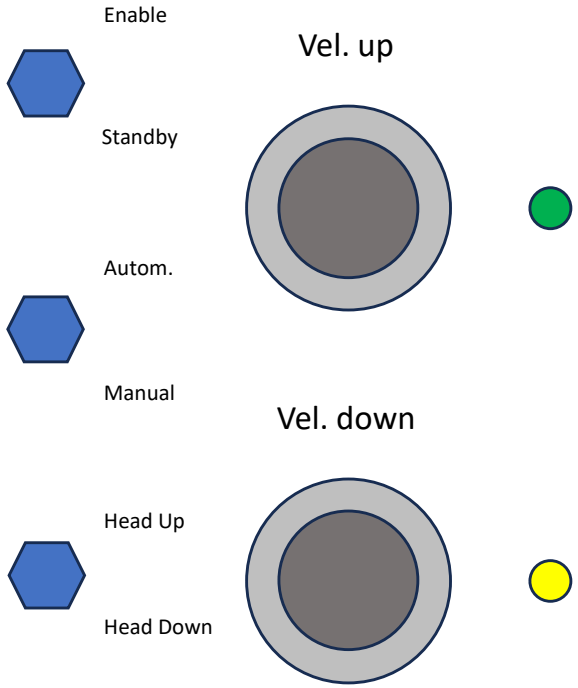
Front panel 1/1,5

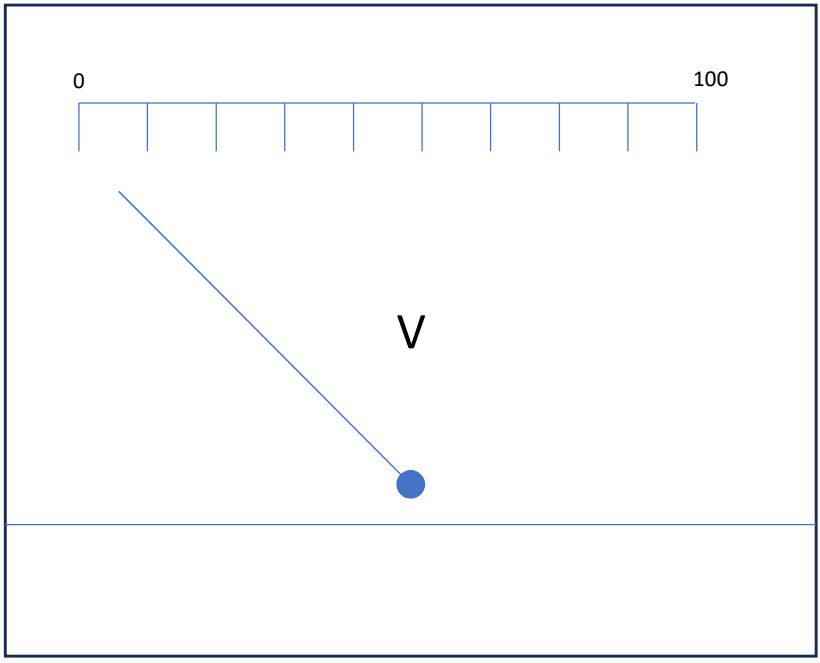
Working current 2 A basic plus additions:



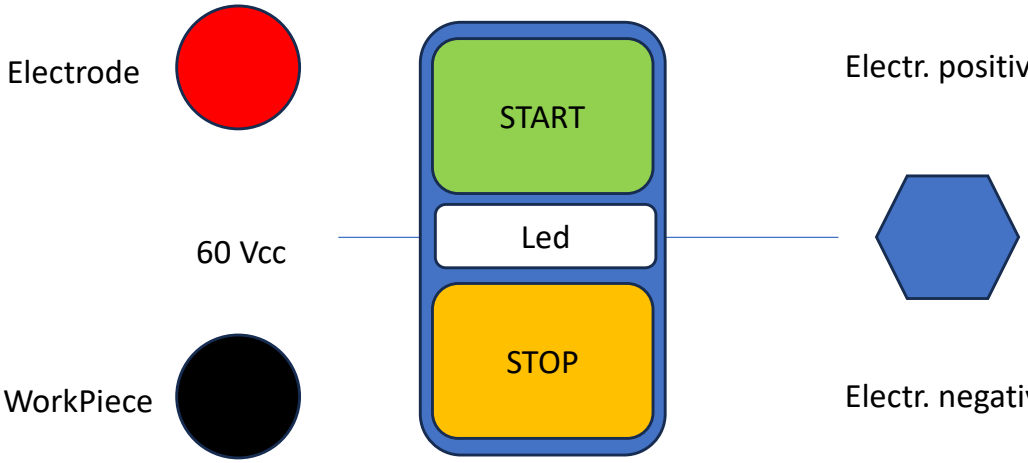
Capacitors 25 uF basic plus additions:







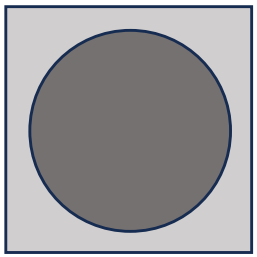
GAP voltage window

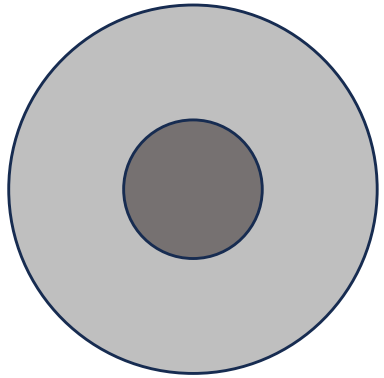


Electr. positive

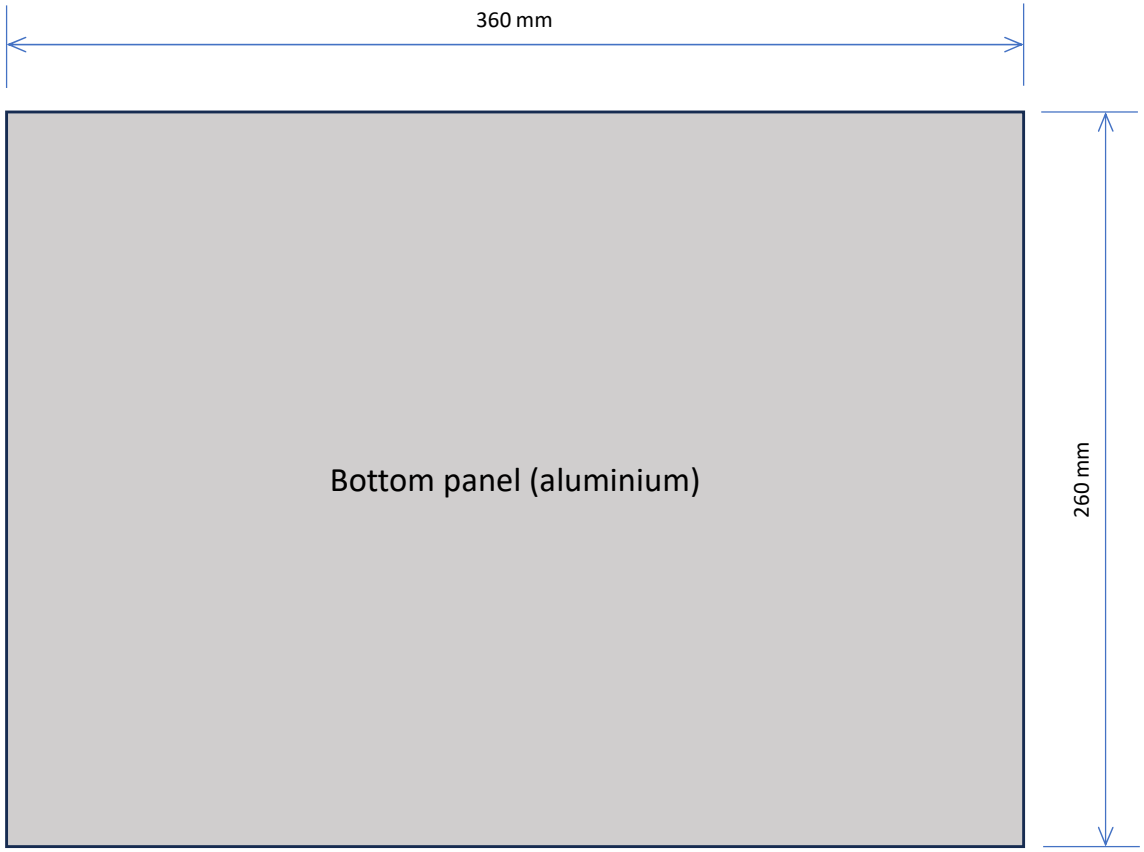
Electr. negative

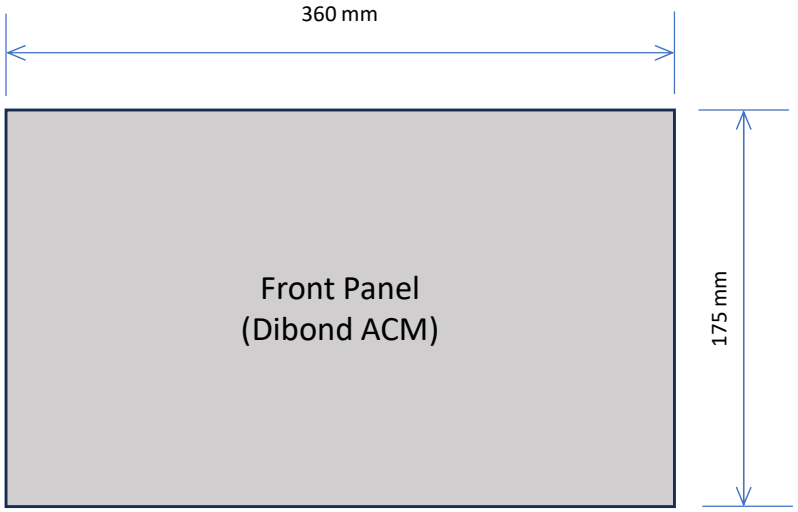
Head plug



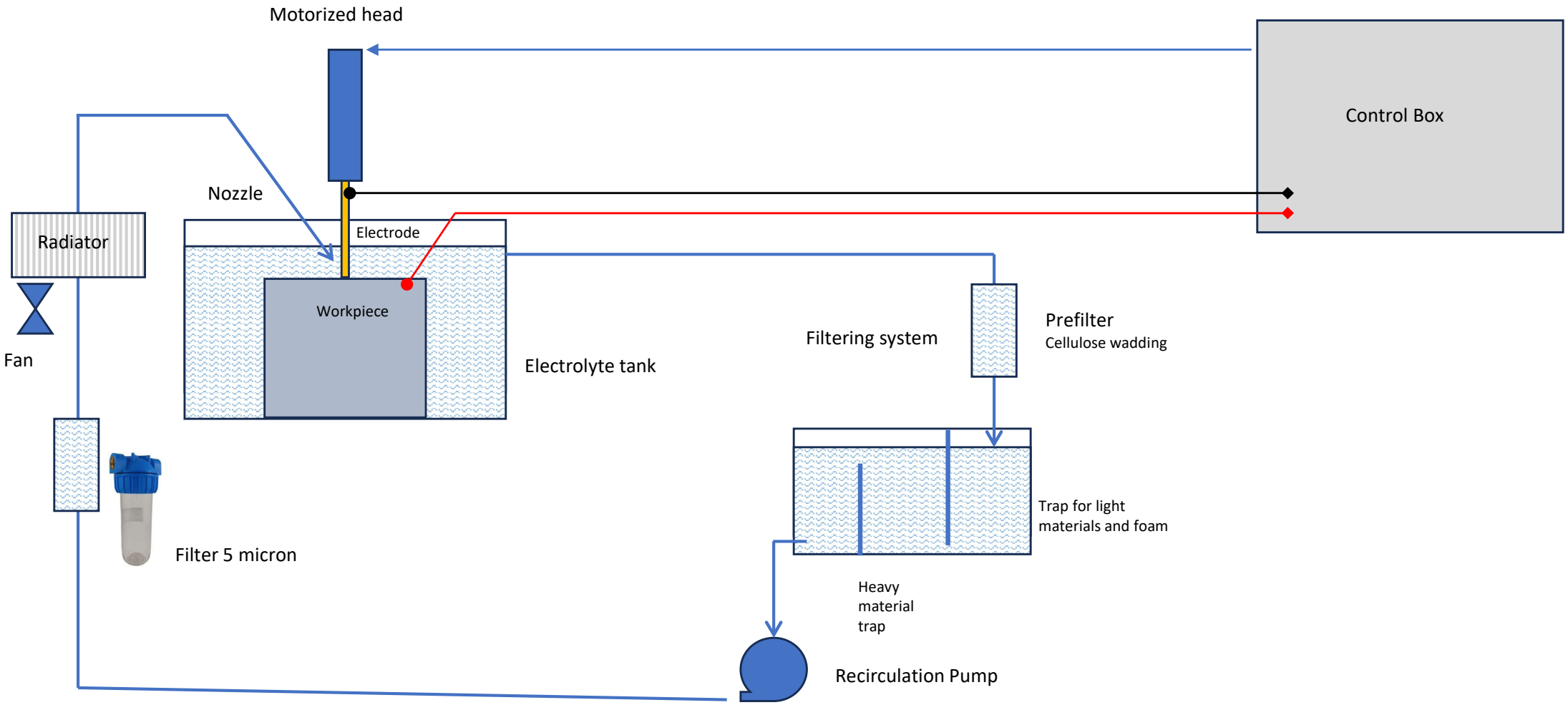


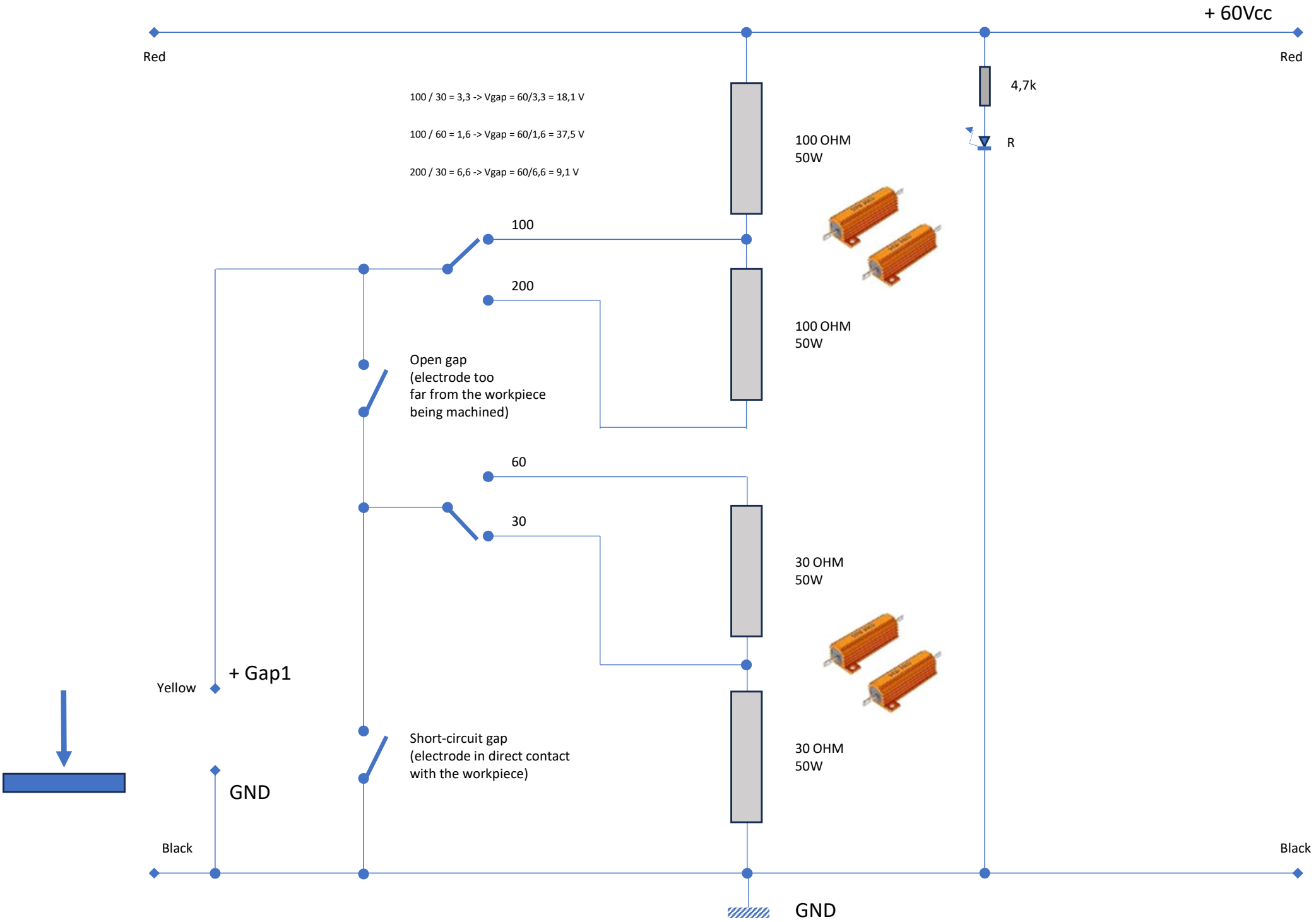
EDM-RC-60V-5A


360 mm
Bottom panel (aluminium)
260 mm


360 mm
Front Panel
(Dibond ACM)
175 mm

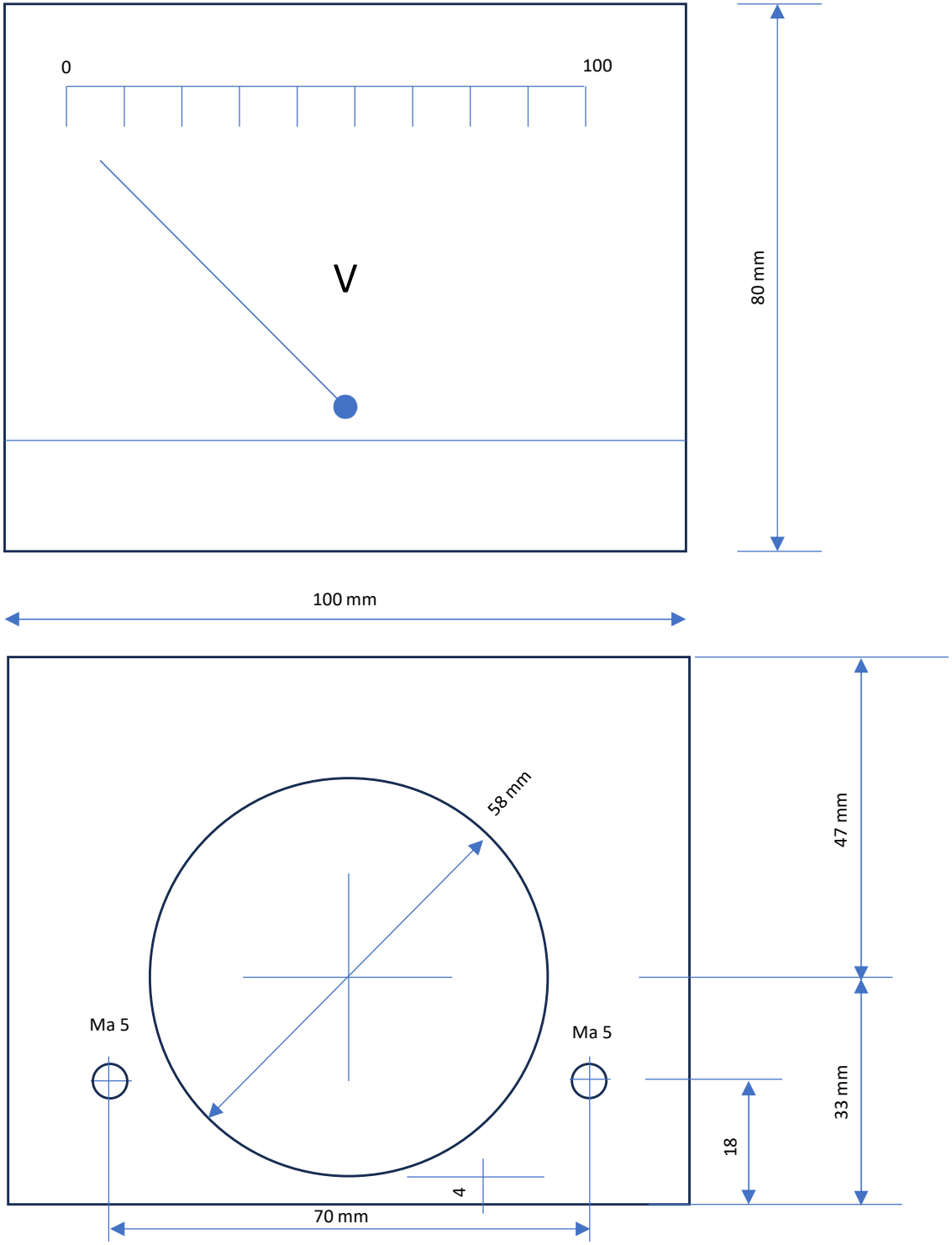
Conceptual diagram of the EDM system

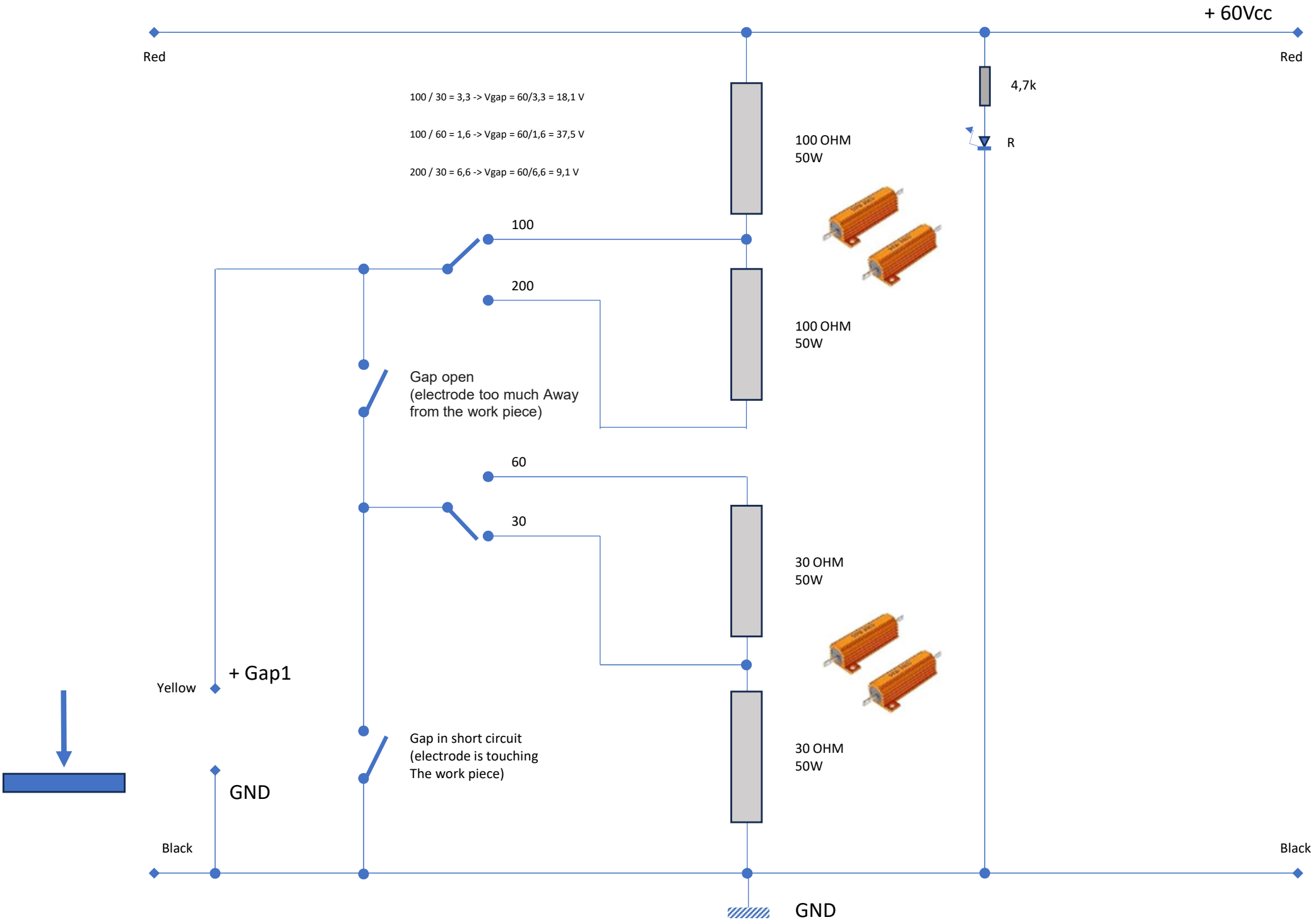




DUMMY LOAD FOR GAP SIMULATION

BOZZE


0
100
V
80 mm
100 mm
58 mm
47 mm
Ma 5
Ma 5
33 mm
18
4
70 mm



DUMMY LOAD FOR GAP SIMULATION

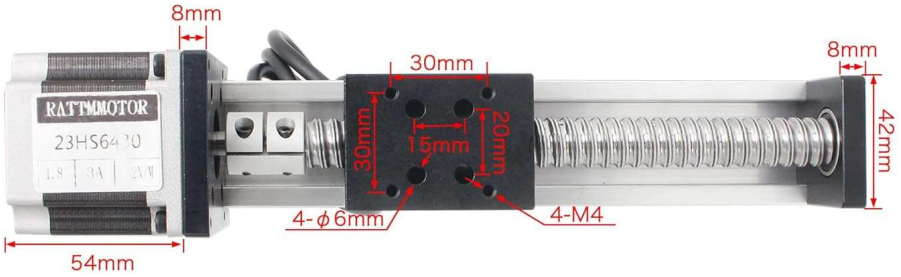
Deviatore	Posizione	Peso										Peso	Posizione	Interruttore
Condensatore fisso da 25 uF da sommare ai valori selezionati dai 3 deviatori														
SW5	1	25 uF	0	1	1	1	0	0	1	1	0	25 uF	1	SW5
	2	50 uF	0	0	0	0	0	1	0	0	1	50 uF	2	
SW6	1	25 uF	0	0	1	1	0	0	1	0	0	25 uF	1	SW6
	2	50 uF	0	0	0	0	0	1	0	1	1	50 uF	2	
SW7	1	25 uF	0	0	0	1	0	0	0	0	0	25 uF	1	SW7
	2	80 uF	0	0	0	0	1	0	1	1	1	80 uF	2	
			25 + 0	25+25	25+25+25	25+25+25+25	25+80	25+50+50	25+25+25+80	25+25+50+80	25+50+50+80			
Capacità totale			25 uF	50 uF	75 uF	100 uF	105 uF	125 uF	155 uF	180 uF	205 uF	Capacità totale		

RATTMMOTOR Guida lineare, 100 mm, lunghezza lineare, guida lineare CNC, guida lineare da tavolo, guida lineare SFU1605, mandrino a sfera con motore passo-passo NEMA23

- **Numero modello articolo :** RTM-CBX1605

- Parametri di base: velocità 0-50 mm/s, precisione delle viti: C7;
- corsa efficace 100 mm, pendenza 5 mm (il mandrino si muove 5 mm in un giro)

[RATTMMOTOR Guida lineare, 100 mm, lunghezza lineare, guida lineare CNC, guida lineare da tavolo, guida lineare SFU1605, mandrino a sfera con motore passo-passo NEMA23 : Amazon.it: Commercio, Industria e Scienza]

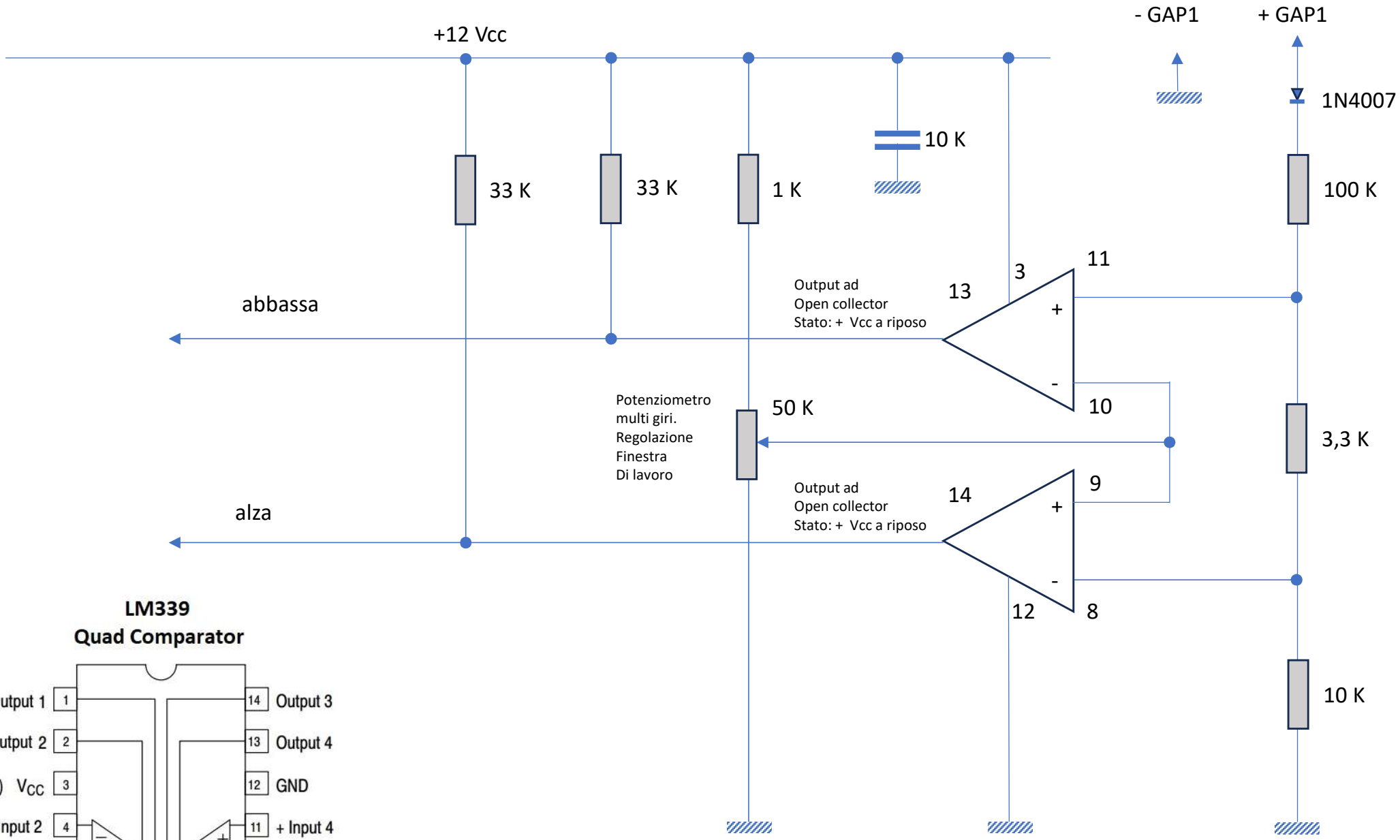


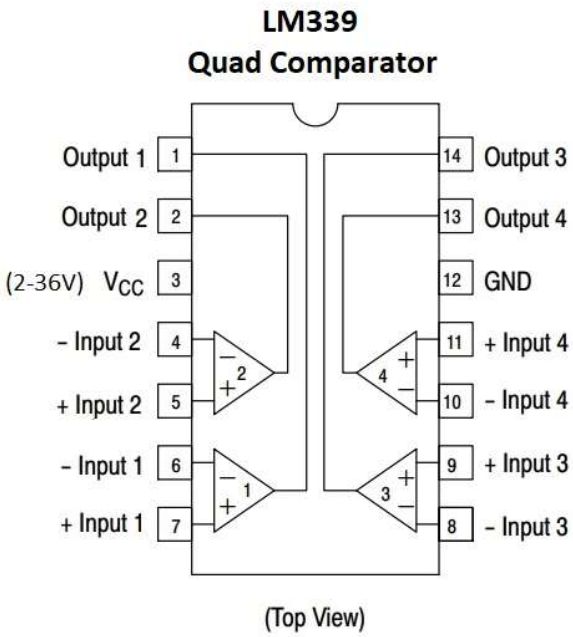
Motore p.p. 200 step/giro

Avanzamento/step: 5 mm:200 = 0,025 mm

Impostazione driver 1/16 step

Risoluzione finale 0,025 / 16 = 0,00156 mm





Dettaglio del comparatore a finestra

+ 12 Vcc

10K

6,8K

10 K

STEPPER MOTOR

RED A+ GRN A- BLU B+ YEL B-

Enable

OLD
20/12/2024
Tested And working

1K 1K

RFcH RFcL

Max Alza

Max Abbassa

10K 10K

CD40893

Automatico

Alza

[1]

SpUp

BC337

10K

47K

1 KHZ

CD4071

1uF

SW8

[1]

Abbassa

A

Al controllo velocità

ICM 555

B

33K

10K

CD4071

A + A - B + B - + Vcc

En + Dir +

Pul +

TB6600

En - Dir - GND Pul -

1K

SpDown

CD4071

Scelta della Direzione Di rotazione Del motore pp Pin 1 o Pin 2 Del CD4093

Manuale

1N4148

GND

+ 12 Vcc

10uF

Salita - discesa manuale

Alza Abbassa

R-up R-down

1K

[STBY all'accensione]

CD4071

330K

1N4148

10K

10uF

BC337

CD 4093

4071

CONTROLLO TESTA

OLD

+ 12 Vcc

10K

1K

33K

33K

- Gap1

+ Gap1

Alza

CD4081

10

8

9

11

12

13

1K

1K

GND

GND

10K

100K

1K -- 3,3 K

10K

Alza

Abbassa

G

V

CD4093

14 13 12 11 10 9 8

1 2 3 4 5 6 7

50K
multi giri
Regolazione
Finestra
Di lavoro

+ 10uF

LM339

14 13 12 11 10 9 8

1 2 3 4 5 6 7

10K

Abbassa

GND

GND

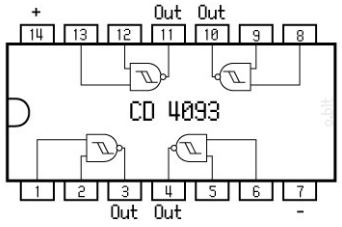
20 V

Assenza di scariche -> la testa si abbassa

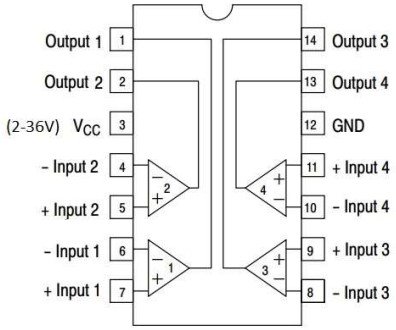
15 V

Finestra di lavoro, scariche regolari, la testa rimane ferma

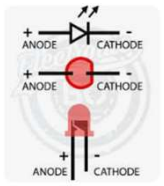
Corto circuito -> la testa si alza

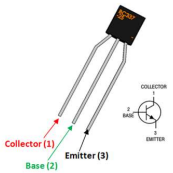


LM339
Quad Comparator



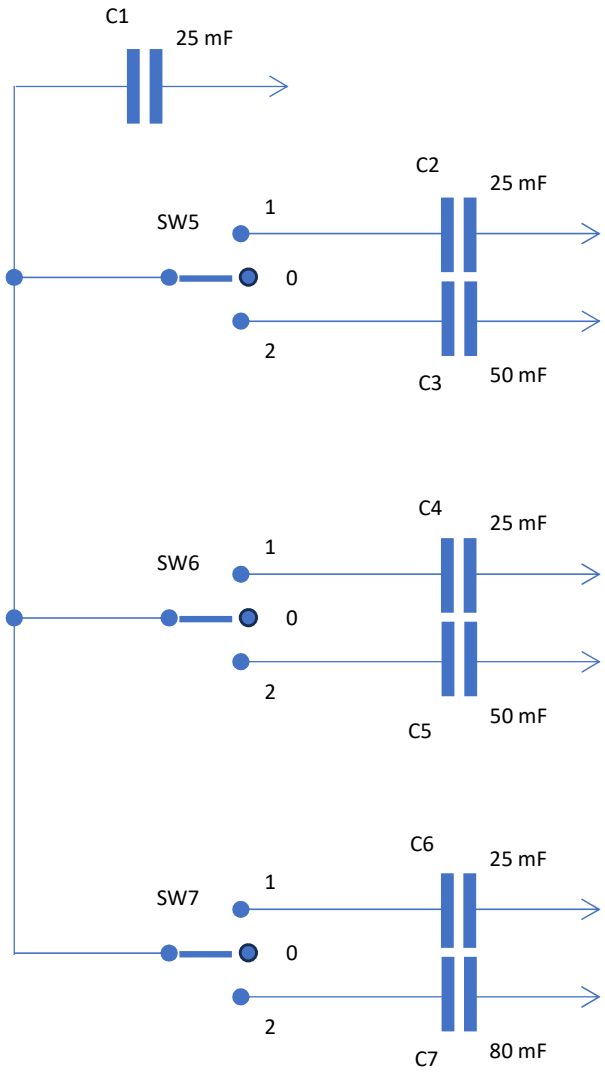
(Top View)





COMPARATORE A FINESTRA
Per monitoraggio tensione GAP

12/12/2024



Banco condensatori