

NV DELTA ELEKTRONIKA



P.O. BOX 27
ZIERIKZEE
NETHERLANDS
TELEPHONE (01110) 2734



REGULATED POWER SUPPLIES

E 015-2 0-15 V, 0-2 A

E 030-1 0-30 V, 0-1 A

E 060-0.6 0-60 V, 0-0.6 A

DESCRIPTION

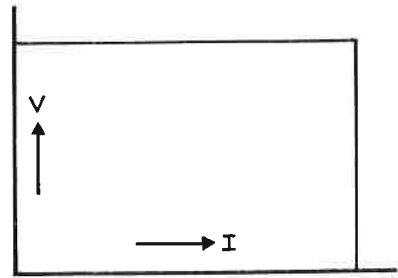
The power supplies E 015-2, E 030-1 and E 060-0.6 have voltage and current regulation.

The voltage regulation changes sharply into current regulation if the setted current limit is reached.

These power supplies can be used as a constant voltage source with a limited current or as a constant current source with a limited open voltage.

Both limits are continuously variable.

The constant voltage/constant current design provides complete protection against all overload and short circuit conditions.



CONSTANT VOLTAGE OPERATION

Voltage control	10-turn potentiometer, range 0-100 %.
Remote programming	The voltage can be programmed by an external variable resistor of 0-5000 Ohm. (10 k Ω for E 060-0.6). Input on front panel.
Voltage regulation	5 mV for a + or - 10 % AC input voltage variation. 10 mV for a 0-100 % load variation.
Temp. coeff.	$2 \cdot 10^{-4}$ per $^{\circ}\text{C}$ from maximum output voltage.
Ripple voltage	0.1 mV r.m.s., 0.5 mV p-p.
Output impedance	Maximum 0.1 Ohm up to 100 kHz.
Recovery time	15 micro seconds for recovery to within 30 mV after a step load change from 10 % to 100 %.

CONSTANT CURRENT OPERATION

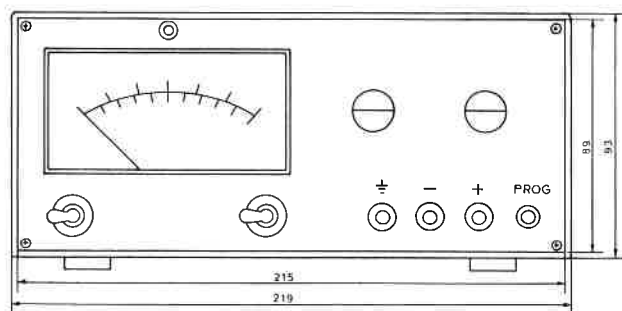
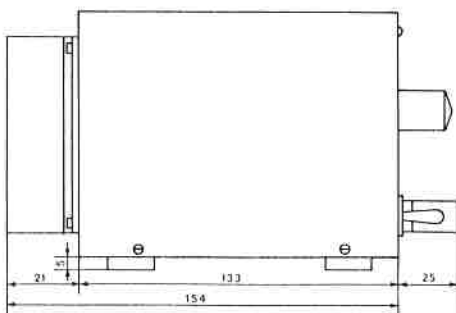
Current control	Single turn potentiometer, range 0-100 %.
Current regulation	0.3 mA for a + or - 10 % AC input voltage variation. 2 mA for a maximum output voltage swing.
Temp. coeff.	$5 \cdot 10^{-4}$ per $^{\circ}\text{C}$ from maximum output current.
Ripple current	0.1 mA r.m.s.

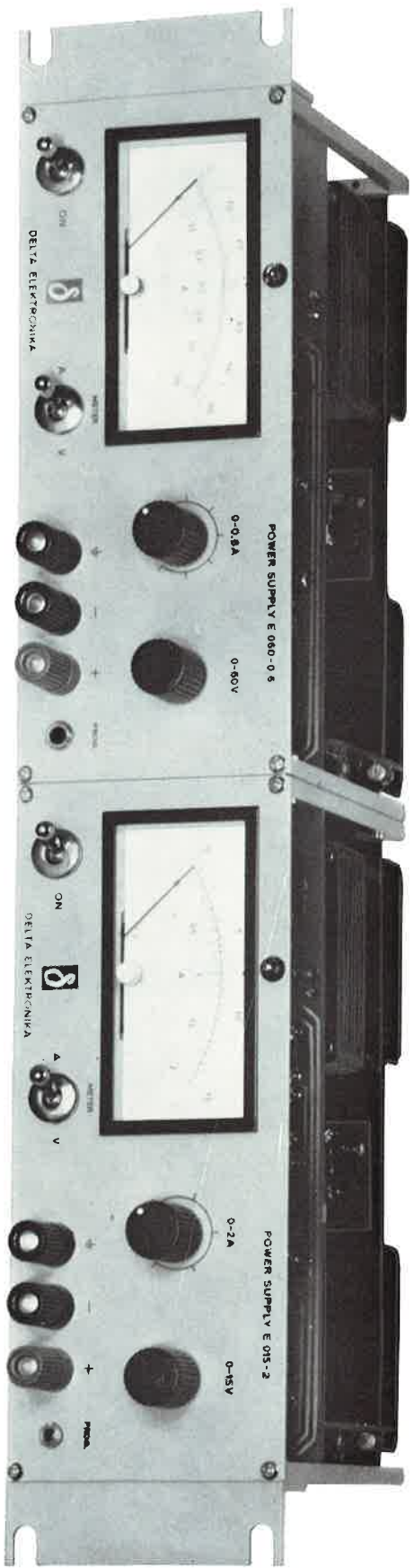
REMAINING SPECIFICATIONS

Input voltage	220 V, 50 Hz. Other input voltages at special order.
Parallel and series connection	Special design enables parallel and series operation without precaution.
Ambient temp.	- 20 to + 45 °C (to + 35 °C for E 015-2 if used at 2 A below 10 V).
Meter	Meter with selector switch for voltage and current, accuracy 1.5 % f.s.
Finish	Light grey front panel with dark grey case.
Weight and size	2.7 kg 219 x 93 x 154 mm.

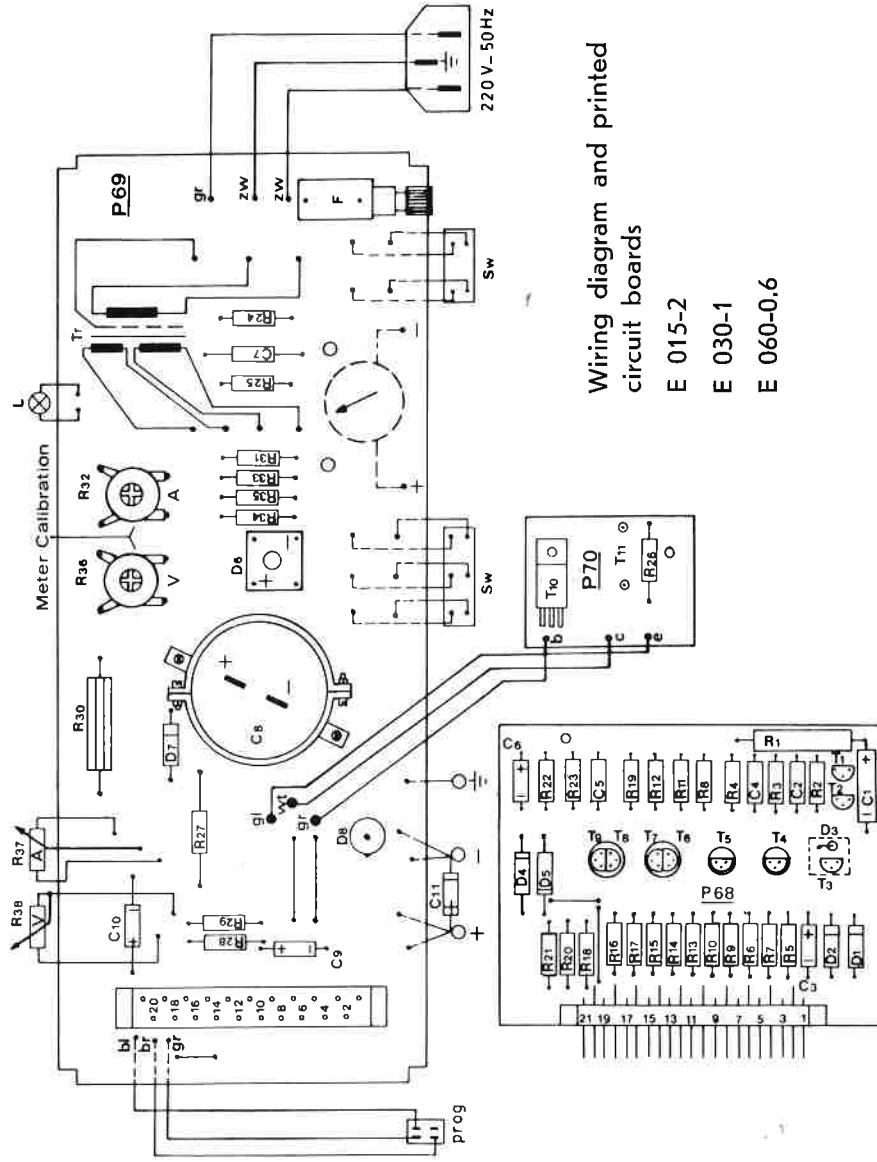


For uncased unit
add B to typenumber



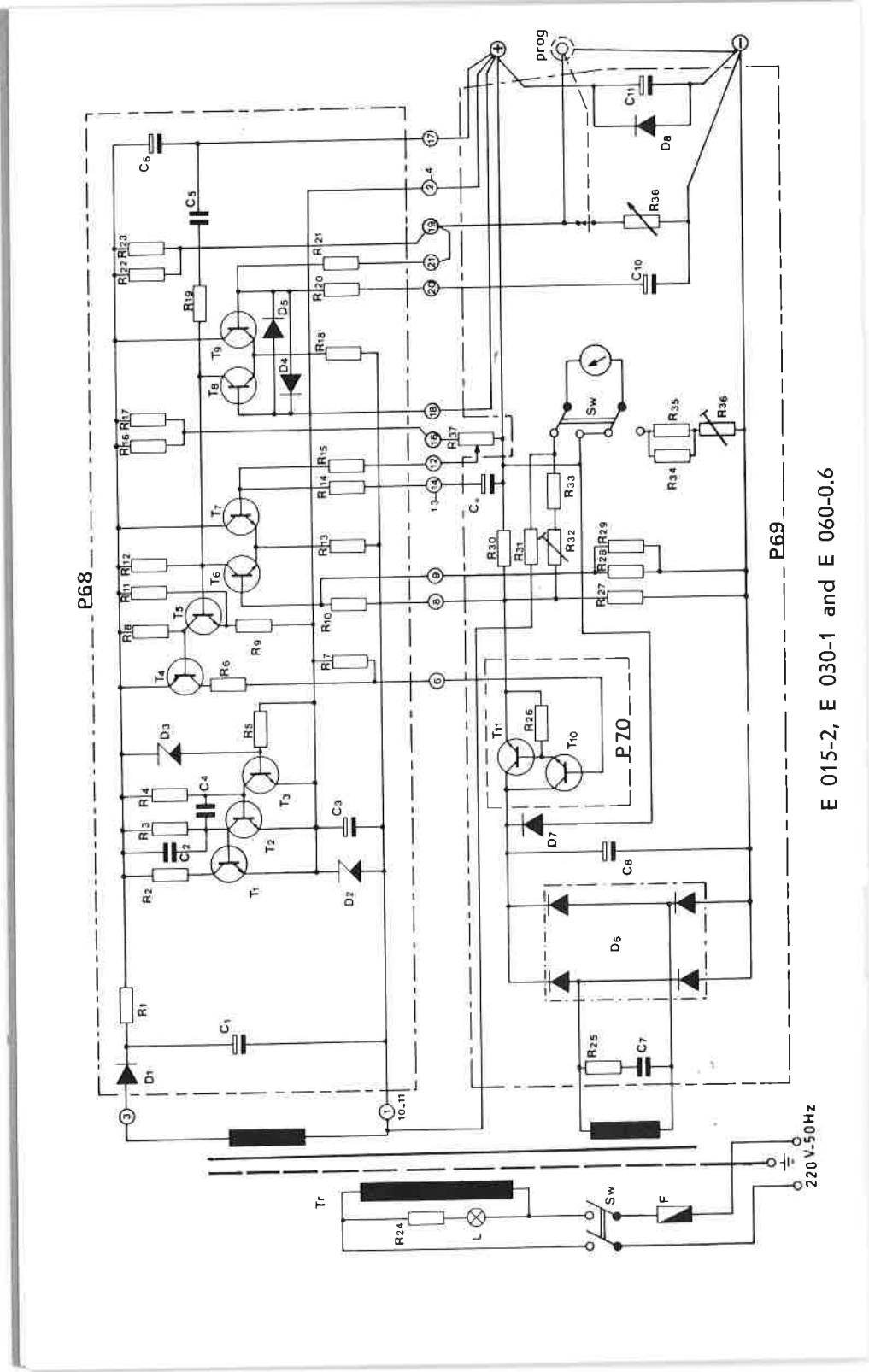


Two uncased units can be mounted side by side and with the addition of two H 6 brackets can be inserted in a 19" rack.



Wiring diagram and printed circuit boards

- E 015-2
- E 030-1
- E 060-0,6



E 015-2, E 030-1 and E 060-0.6

PART LIST

E 015-2	E 030-1	E 060-0.6	
R (Ohm)			
1 = 820	680	680	1W
2 = 150	150	150	
3 = 10 k	10 k	10 k	
4 = 10 k	10 k	10 k	
5 = 150	150	150	
6 = 33	33	33	
7 = 1 k	1 k	1 k	
8 = 2,2 k	2,2 k	2,2 k	
9 = 2,2 k	2,2 k	2,2 k	
10 = 470	470	470	
11 = 2,7 k	2,7 k	2,7 k	
12 = 22 k	22 k	22 k	
13 = 6,8 k	6,8 k	6,8 k	
14 = 470	470	470	
15 = 470	470	470	
16 = CR	CR	CR	
17 = 12 k	12 k	12 k	
18 = 6,8 k	6,8 k	6,8 k	
19 = 150	150	150	
20 = 470	470	470	
21 = 470	470	470	
22 = CR	CR	CR	
23 = 2,2 k	1,2 k	1,2 k	
24 = 560 k	560 k	560 k	
25 = 82	82	82	
26 = 10	10	10	
27 = 560	1,5 k	5,6 k	1W
28 = 2,7 M	1,2 M	820 k	
29 = CR	CR	CR	
30 = 1	1,8	3,3	7W WW
31 = 1,2 M	680 k	330 k	
32 = 1 k	1 k	1 k	var.
33 = 1,5 k	1,5 k	1,5 k	
34 = 15 k	33 k	68 k	
35 = CR	CR	CR	
36 = 1 k	1 k	1 k	var.
37 = 5 k	5 k	5 k	var. WW
38 = 5 k	5 k	10 k	10 t. potm.

E 015-2

E 030-1

E 060-0.6

C (microfarad)

1 =	47	63 V	47	63 V	47	63 V
2 =	0,01	250 V	0,01	250 V	0,01	250 V
3 =	22	25 V	22	25 V	22	25 V
4 =	0,01	250 V	0,01	250 V	0,01	250 V
5 =	0,047	250 V	0,047	250 V	0,047	250 V
6 =	22	25 V	22	25 V	22	25 V
7 =	0,22	250 V	0,22	250 V	0,22	250 V
8 =	4700	35 V	2200	63 V	1000	100 V
9 =	10	35 V	10	35 V	10	35 V
10 =	10	100 V	10	100 V	10	100 V
11 =	47	35 V	47	63 V	50	100 V

D

1 =	1N4003	1N4003	1N4003	Texas I.
2 =	ZD 6,2	ZD 6,2	ZD 6,2	ITT
3 =	ZP 6,2	ZP 6,2	ZP 6,2	ITT
4 =	1N4148	1N4148	1N4148	ITT
5 =	1N4148	1N4148	1N4148	ITT
6 =	VH 148	VH 148	VH 148	VARO
7 =	1N4003	1N4003	1N4003	Texas I.
8 =	MR 1031 B	MR 1031 B	MR 1031 B	Motorola

T

1 =	BC 182	BC 182	BC 182	Texas I.
2 =	BC 182	BC 182	BC 182	Texas I.
3 =	BC 182	BC 182	BC 182	Texas I.
4 =	BC 212	BC 212	BC 212	Texas I.
5 =	BC 182	BC 182	BC 182	Texas I.
6 =	BC 182	BC 182	BC 182	Texas I.
7 =	BC 182	BC 182	BC 182	Texas I.
8 =	BC 182	BC 182	BC 182	Texas I.
9 =	BC 182	BC 182	BC 182	Texas I.
10 =	TIP 29 A (Texas I.)	TIP 29 A (Texas I.)	MJE 340	Motorola
11 =	2N3055	2N3055	2N3442	RCA

F = Fuse 1 A - 5 x 20 mm
2 A for 117 V

WW = Wire wound resistor

CR = Calibration resistor

All other resistors

1/2 W 2 % metal film

E 015-2

E 030-1

E 060-0.6

C = microfarad

1 = 47	63 V	47	63 V	47	63 V
2 = 22	25 V	22	25 V	22	25 V
3 = 0,047	250 V	0,047	250 V	0,047	250 V
4 = 2,2	35 V tantaal	2,2	35 V tantaal	2,2	35 V tantaal
5 = CC		CC		CC	
6 = 22	25 V	22	25 V	22	25 V
7 = CC		CC		CC	
8 = 0,22	250 V	0,22	250 V	0,22	250 V
9 = 4700	35 V	2200	63 V	1000	100 V
10 = 10	35 V	10	35 V	10	35 V
11 = 10	100 V	10	100 V	10	100 V
12 = 2 x 100	35 V	2 x 100	63 V	2 x 100	100 V
13 = 0,01	750 V	0,01	750 V	0,01	750 V
14 = 0,01	750 V	0,01	750 V	0,01	750 V

T

1 = BC 182	BC 182	BC 182	TI
2 = TIP 29 A	TIP 29 A	MJE 340	Motorola
3 = 2N3055	2N3055	2N3442	RCA

IC1 = SN 72741 P

IC2 = SN 72747

SN 72741 P

SN 72747

SN 72741 P

SN 72747

TI

TI

Fuse : 1 A -5x20 mm

WW = Wire wound resistor

CR = Calibration resistor

CC = Calibration capacitor

All other resistors $\frac{1}{2}$ W 2% metal film.

PART LIST: serial no 6939 and up

E 015-2

E 030-1

E 060-0.6

R = Ohm

1 = 680 1W
 2 = 270
 3 = CR
 4 = 470
 5 = 3,9 k
 6 = 6,8 k
 7 = 1,8 k
 8 = 1 M
 9 = 470
 10 = 470
 11 = 27 k
 12 = CR
 13 = 470
 14 = 470
 15 = 470
 16 = 470
 17 = 470 k
 18 = CR
 19 = 4,7 k
 20 = CR
 21 = CR
 22 = 560 k
 23 = 82
 24 = 10
 25 = 560 1W
 26 = 2,7 M
 27 = CR
 28 = 1 7W WW
 29 = 1,2 M
 30 = 1 k trim.
 31 = 1,5 k
 32 = 15 k
 33 = CR
 34 = 1 k trim.
 35 = 5 k potm.
 36 = 5 k 10 t. potm.

680 1W
 270
 CR
 470
 3,9 k
 6,8 k
 1,8 k
 1 M
 470
 470
 18 k
 CR
 470
 470
 470
 470
 330 k
 CR
 1,8 k
 CR
 CR
 560 k
 82
 10
 1,5 k 1W
 1,2 M
 CR
 1,8 7W WW
 680 k
 1 k trim.
 1,5 k
 33 k
 CR
 1 k trim.
 5 k potm.
 5 k 10 trn potm.

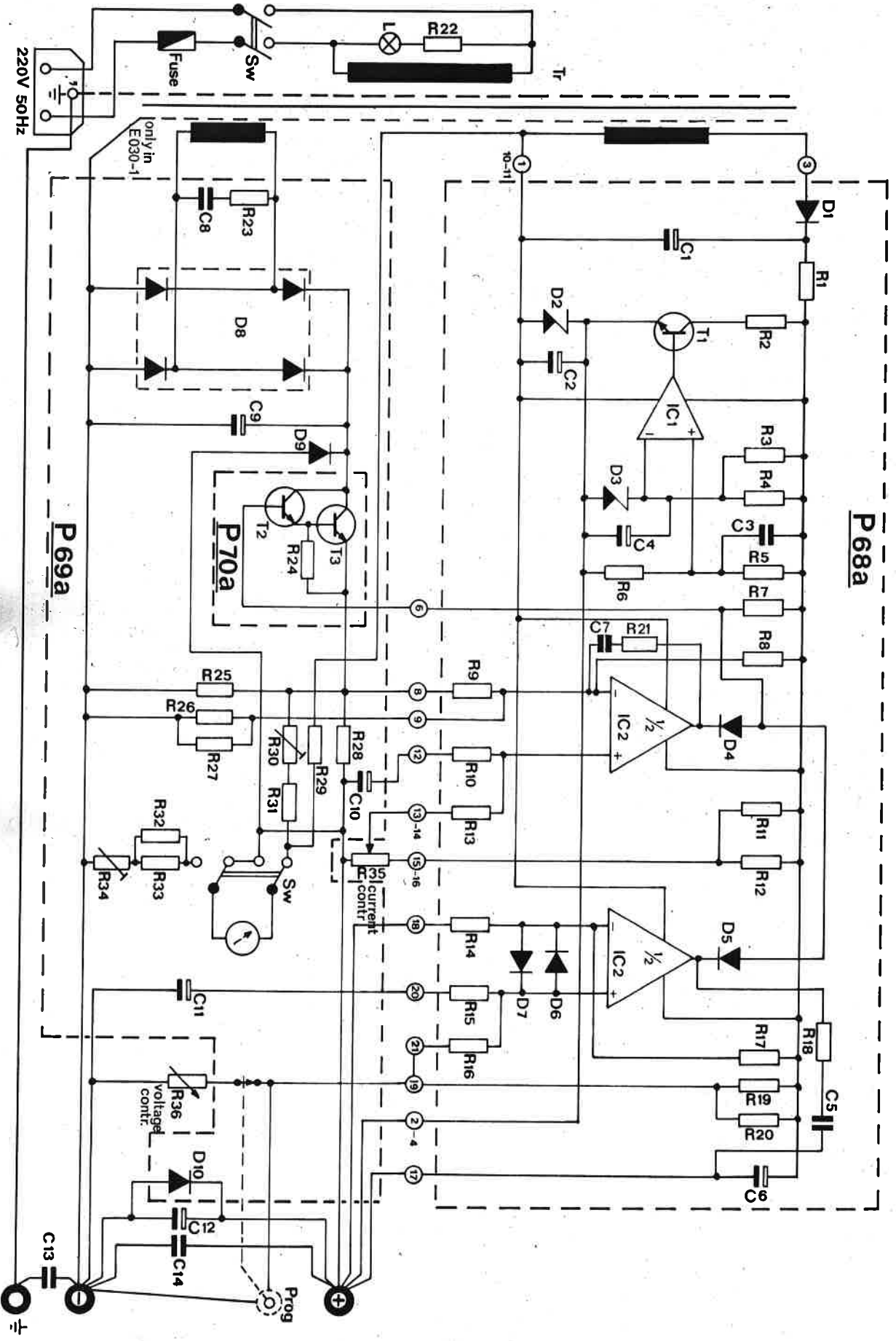
560 1W
 270
 CR
 470
 3,9 k
 6,8 k
 1,8 k
 560 k
 470
 470
 18 k
 CR
 470
 39
 470
 470
 150 k
 CR
 1,8 k
 CR
 CR
 560 k
 82
 47
 5,6 k 1W
 820 k
 CR
 3,3 k 7W WW
 330 k
 1 k trim.
 1,5 k
 68 k
 CR
 1 k trim.
 5 k potm.
 10 k 10 t. potm.

D

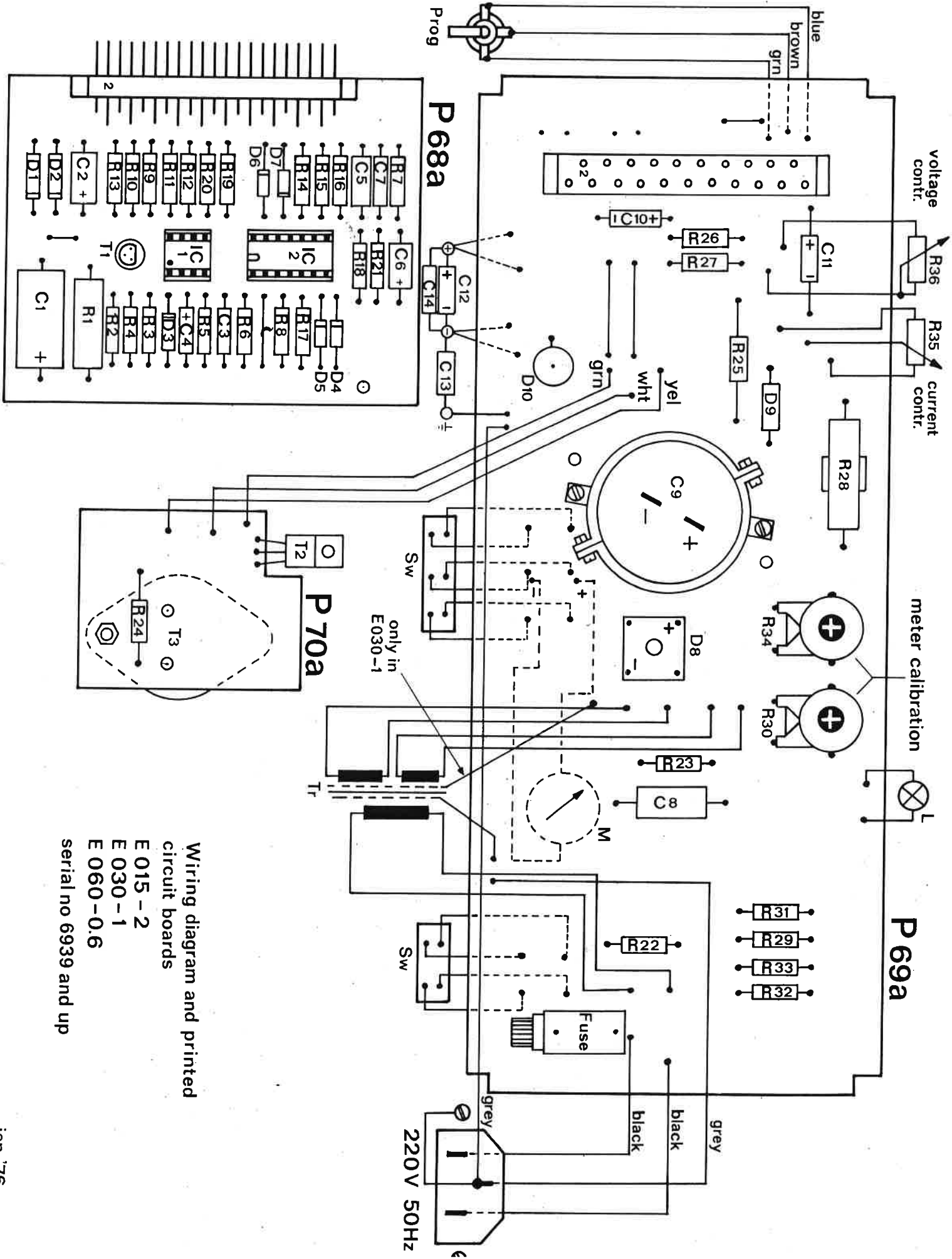
1 = 1N4003
 2 = ZY 6,2
 3 = 1N825
 4 = 1N4148
 5 = 1N4148
 6 = 1N4148
 7 = 1N4148
 8 = VH 148
 9 = 1N4003
 10 = MR 1031 B

1N4003
 ZY 6,2
 1N825
 1N4148
 1N4148
 1N4148
 1N4148
 1N4148
 VH 148
 1N4003
 MR 1031 B

1N4003 TI
 ZY 6,2 ITT
 1N825 ITT
 1N4148 ITT
 1N4148 ITT
 1N4148 ITT
 1N4148 ITT
 1N4148 ITT
 VH 148 Varo
 1N4003 TI
 MR 1031 B Motorola.



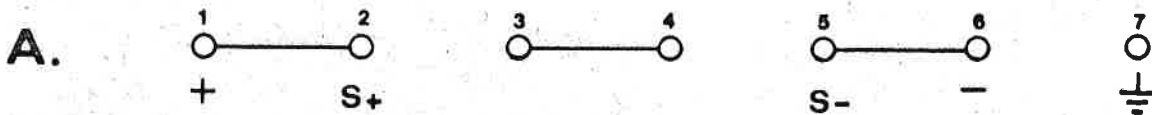
circuit diagram E015-2 , E030-1 , E060-0.6
 serial no 6939 and up



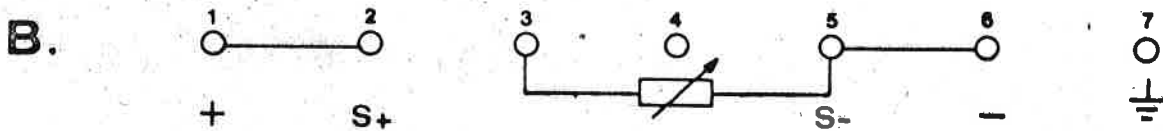
Wiring diagram and printed
 circuit boards
 E 015 - 2
 E 030 - 1
 E 060 - 0.6
 serial no 6939 and up

E 015-2
 E 030-1
 E 060-0.6

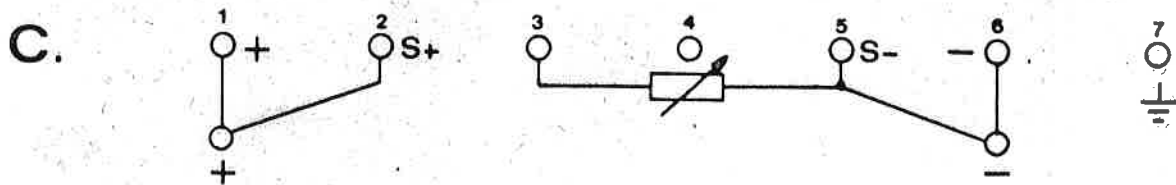
Speciale uitvoering met achteraansluitingen



Doorverbindingen indien van de achteraansluitingen geen gebruik wordt gemaakt.

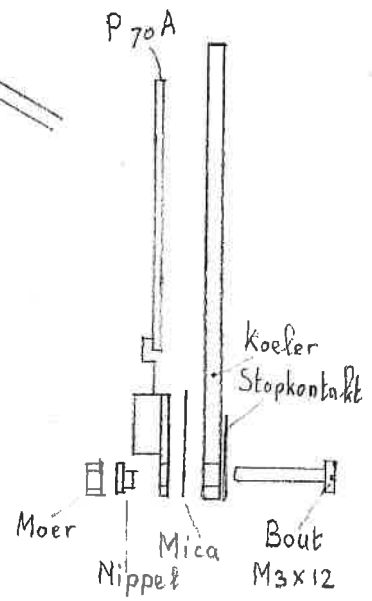
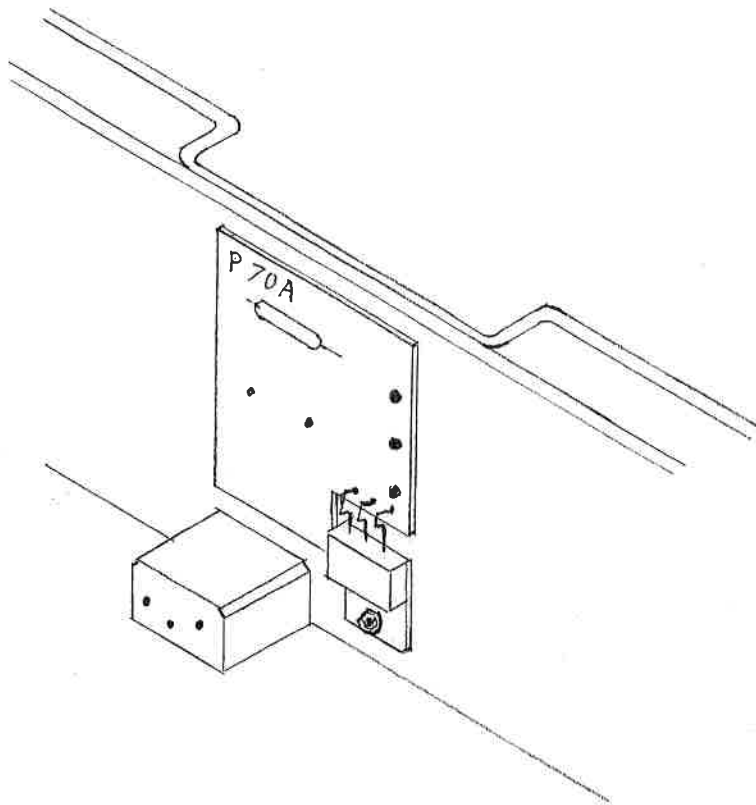


Spanningsinstelling uitwendig door middel van variabele weerstand.
 0-5 k Ohm voor E 015-2 en E 030-1 of 0-10 k Ohm voor E 060-0.6.



Spanningsinstelling uitwendig.
 Bovendien spanningsstabilisatie ter plaatse van de belasting door gebruikmaking van de senspunten.

Montage print P70A



DELTA ELEKTRONIKA BV



P.O. BOX 27
 4300 AA ZIERIKZEE
 NETHERLANDS
 TEL. (01110) 3656 TLX 55349



**REGULATED
 POWER SUPPLIES**

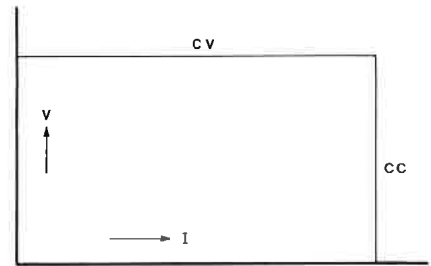
E 015-2	0- 15 V	0-2 A
E 030-1	0- 30 V	0-1 A
E 030-3	0- 30 V	0-3 A
E 060-0.6	0- 60 V	0-0.6 A
E 0300-0.1	0-300 V	0-0.1 A
E 018-0.6 D	± 0- 18 V	0.6 A

DESCRIPTION

E 015-2, E 030-1 and E 060-0.6

These power supplies are of the linear transistor series regulator type. They can be used as a constant voltage source with a sharply limited current, or as a constant current source with a sharply limited open voltage. Both limits are continuously variable from zero to full range. The change of mode occurs at the crossing of the voltage and current settings.

A ten-turn potentiometer is used to provide a high resolution voltage control. For current control a single turn potentiometer (resolution 0,1 %) is used to enable an approximate indication of the current setting.



E 030-3 and E 0300-0.1

These models also have a linear transistor series regulator which however is preceded by an SCR pre-regulator for better efficiency.

This pre-regulator keeps the rectified voltage in accordance with the output voltage to keep dissipation in the power transistors low.

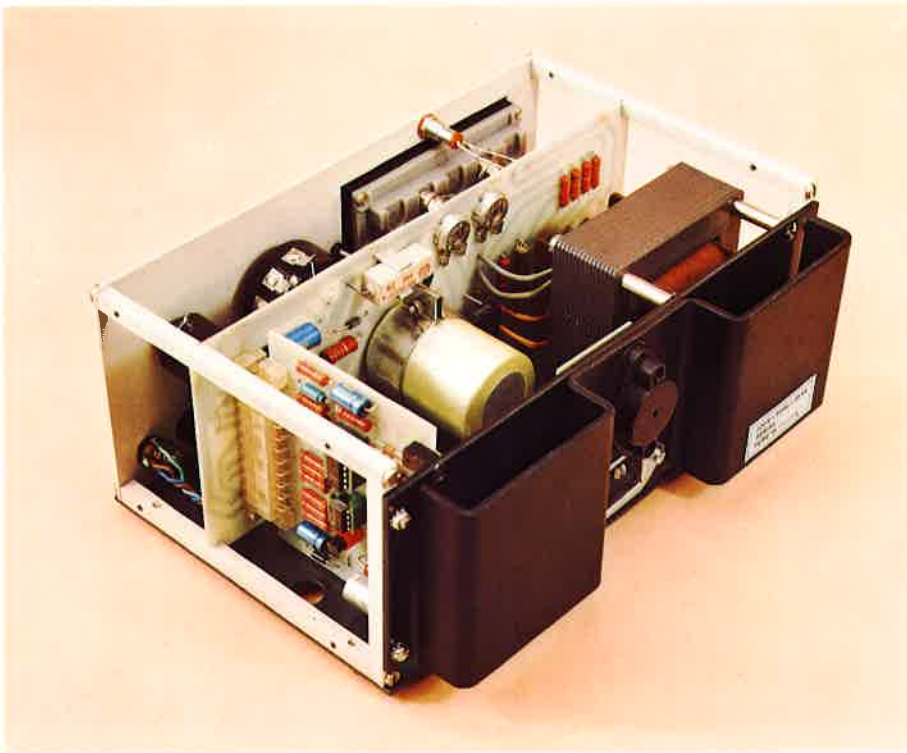
E 018-0.6 D

This model was designed to supply plus and minus 15 volts for design work with operational amplifiers. It provides a plus 0–18 V and a minus 0–18 V which are tracking and can be varied with one ten-turn potentiometer. With the second potentiometer the ratio of the positive and negative voltage can be varied between $\frac{1}{2}$ and 2. The positive and negative outputs have coupled overload protection circuits. This means that both output voltages will decrease proportionally if one is overloaded. Also if one output is short circuited, both outputs will drop to zero. The E 018-0.6 D has a fixed constant current overload characteristic. Independent of the ratio setting, the positive and negative output can never exceed a limit of about 18,5 V.

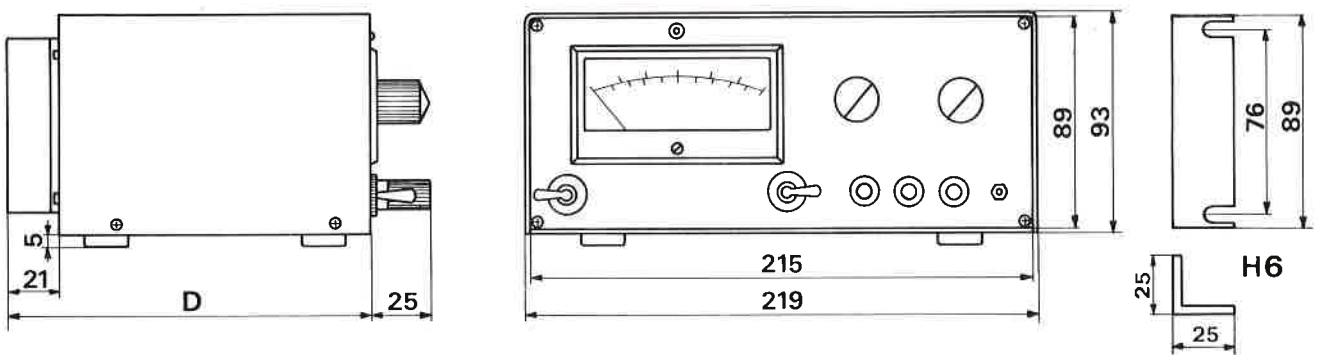
SPECIFICATIONS

Input voltage	220 V 50 Hz standard. Other input voltages at special order.
Input-output isolation	1500 V AC rms 1 minute (VDE 0550).
Max. voltage between output and case	500 V DC.
Max. ambient temperature	45°C.
Meter	Accuracy 1.5 % of fsd, selector switch for voltage and current measurement.
Parallel and series connection	Units can be connected parallel and in series. Series connection up to 300 V.
Weight and size	2.8 kg 219 x 93 x 154 mm 30 Watts type. 5.7 kg 219 x 93 x 222 mm E 030-3

SPECIFICATIONS	E 015-2	E 030-1	E 030-3	E 060-0.6	E 0300-0.1	E 018-0.6 D
CONSTANT VOLTAGE MODE						
Line regulation for 198–242 V variation	1 mV	2 mV	2 mV	4 mV	10 mV	5 mV
Load regulation for 0–100 % variation.	2 mV	4 mV	4 mV	8 mV	20 mV	5 mV
Temp. coefficient per °C (% of V max)	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
Drift per 8 hours under constant conditions after 15 minutes warm up	0.1 %	0.1 %	0.1 %	0.1 %	0.1 %	0.1 %
Ripple voltage, rms	0.1 mV	0.1 mV	0.1 mV	0.1 mV	0.5 mV	0.1 mV
Output impedance at 100 kHz load frequency	100 mΩ	100 mΩ	100 mΩ	100 mΩ	10 Ω	100 mΩ
Recovery time to within 30 mV after a step load change from 10 to 100 %	15 μS	15 μS	15 μS	15 μS	30 μS	15 μS
Remote programming of output voltage by resistance	0–5 kΩ	0–5 kΩ	0–5 kΩ	0–10 kΩ	—	—
CONSTANT CURRENT MODE						
Line regulation for 198–242 V variation	0.3 mA	0.3 mA	0.4 mA	0.3 mA	0.03 mA	—
Load regulation for zero to max. load	2 mA	2 mA	4 mA	2 mA	0.5 mA	—
Temp. coefficient per °C (% of I max.)	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	—
Ripple current rms	0.1 mA	0.1 mA	0.1 mA	0.1 mA	0.1 mA	—



Simple construction and use of high quality components forms unique reliable unit.



For E 030-3 D = 222 mm, for all other models D = 154 mm.



Two uncased units can be mounted side by side and with the addition of two H6 brackets can be inserted in a 19" rack.

E 015-2

E 030-1

E 060-0.6

R = Ohm

1 = 680 2,5W
 2 = 270
 3 = CR
 4 = 470
 5 = 3,9 k
 6 = 6,8 k
 7 = 1,8 k
 8 = 470 k
 9 = 470
 10 = 470
 11 = 18 k
 12 = CR
 13 = 470
 14 = 47
 15 = 470
 16 = 470
 17 = 47 k
 18 = CR
 19 = 3,3 k
 20 = CR
 21 = CR
 22 = 3,3 k
 23 = 0
 24 = 10
 25 = 560 1,6W
 26 = 2,7 M
 27 = CR
 28 = 1 7W WW
 29 = 1,2 M
 30 = 1 k trim.
 31 = 1,5 k
 32 = 15 k
 33 = CR
 34 = 2 k trim.
 35 = 5 k potm.
 36 = 5 k 10 t.potm.
 37 = 270

560 2,5W
 270
 CR
 470
 3,9 k
 6,8 k
 1,8 k
 470 k
 470
 470
 22 k
 CR
 470
 47
 470
 470
 33 k
 CR
 1,8 k
 CR
 CR
 3,3 k
 0
 10
 1,5 k 1,6W
 1,2 M
 CR
 1,8 7W WW
 680 k
 1 k trim.
 1,5 k
 39 k
 CR
 2 k trim.
 5 k potm.
 5 k 10 trn.potm.
 270

560 2,5W
 270
 CR
 470
 3,9 k
 6,8 k
 1,8 k
 470 k
 470
 470
 18 k
 CR
 470
 39
 470
 1 k
 15 k
 CR
 1,8 k
 CR
 CR
 3,3 k
 0
 47
 5,6 k 1,6W
 1,2 M
 CR
 3,3 k 7W WW
 330 k
 1 k trim.
 1,5 k
 68 k
 CR
 5 k trim.
 5 k potm.
 10 k 10 t. potm.
 270

D 1 = 1N4004G
 2 = ZPY 6,2
 3 = 1N825 A
 4 = 1N4148
 5 = 1N4148
 6 = 1N4148
 7 = 1N4148
 8 = VH 148
 9 = 1N4004G
 10 = MR751
 11 = 1N4148
 12 = 133 HR

1N4004G
 ZPY 6,2
 1N825 A
 1N4148
 1N4148
 1N4148
 1N4148
 1N4148
 VH 148
 1N4004G
 MR751
 1N4148
 133 HR

1N4004G Philips
 ZPY 6,2 ITT
 1N825 A Thom.
 1N4148 ITT
 1N4148 ITT
 1N4148 ITT
 1N4148 ITT
 VH 148 Varo
 1N4004G Philips
 MR751 Motorola
 1N4148 ITT
 133 HR Sloan

D10	2.86	Vr	Title: E 015-2 E 030-1 E 060-0.6
R1 = 2,5 W PR52	7.85	Vr	
Serial no 14661 and up	2.82	Vr	Date: Apr. 78
Modifications	Date	App.	delta elektronika bv



E 015-2E 030-1E 060-0.6

C = microfarad

1 = 100 63 V
 2 = 22 25 V
 3 = 0,047 250 V
 4 = 2,2 35 V tt
 5 = CC
 6 = 22 25 V
 7 = CC
 8 = 0,22 250 V
 9 = 4700 40 V
 10 = 10 40 V
 11 = 10 100 V
 12 = 2 x 100 35 V
 13 = 0,01 500 V
 14 = 0,01 500 V
 15 = 0,0001 250 V
 16 = 0,0001 250 V
 17 = 0,0001 250 V
 18 = 0,01 250 V
 19 = 0,022 250 V

100 63 V
 22 25 V
 0,047 250 V
 2,2 35 V tt
 CC
 22 25 V
 CC
 0,22 250 V
 2200 63 V
 10 45 V
 10 100 V
 2 x 100 63 V
 0,01 500 V
 0,01 500 V
 0,0001 250 V
 0,0001 250 V
 0,0001 250 V
 0,01 250 V
 0,022 250 V

100 63 V
 22 25 V
 0,047 250 V
 2,2 35 V tt
 CC
 22 25 V
 CC
 0,22 250 V
 1000 100 V
 10 45 V
 1 250 V
 2 x 100 100 V
 0,01 500 V
 0,01 500 V
 0,0001 250 V
 0,0001 250 V
 0,0001 250 V
 0,01 250 V
 0,022 250 V

T 1 = BC 546 A
 2 = BD 239 A
 3 = 2N3055

BC 546 A
 BD 239 A
 2N3055

BC 546 A Siemens
 BUX 84 Philips
 2N3442 RCA

IC1 = TL 081 IP
 IC2 = TL 082 IP

TL 081 IP
 TL 082 IP

TL 081 IP TI
 TL 082 IP TI

Fuse : 1 A - 5 x 20 mm


WW = Wire wound resistor

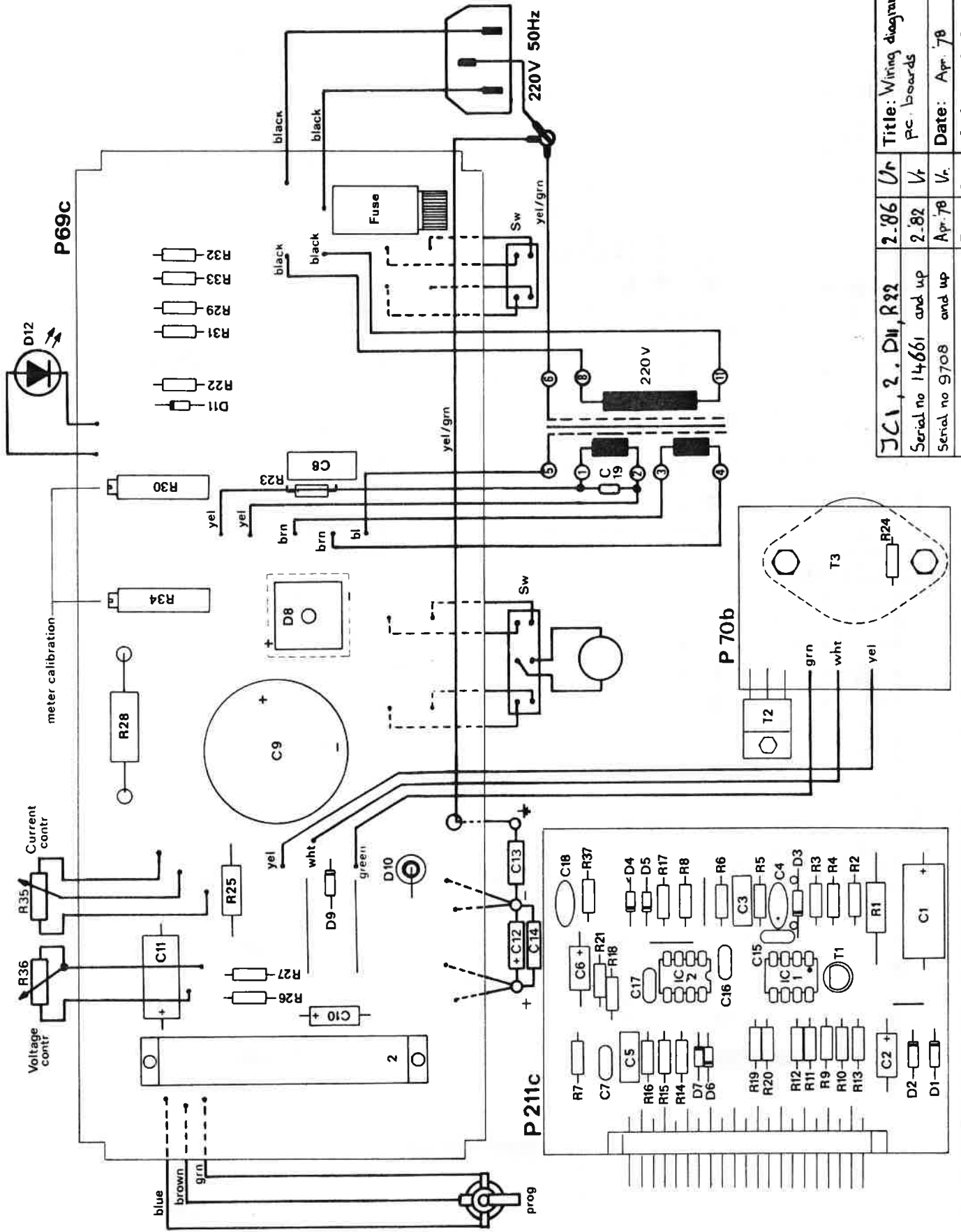
CR = Calibration resistor

CC = Calibration capacitor

All other resistors 0,4 W 2% metal film

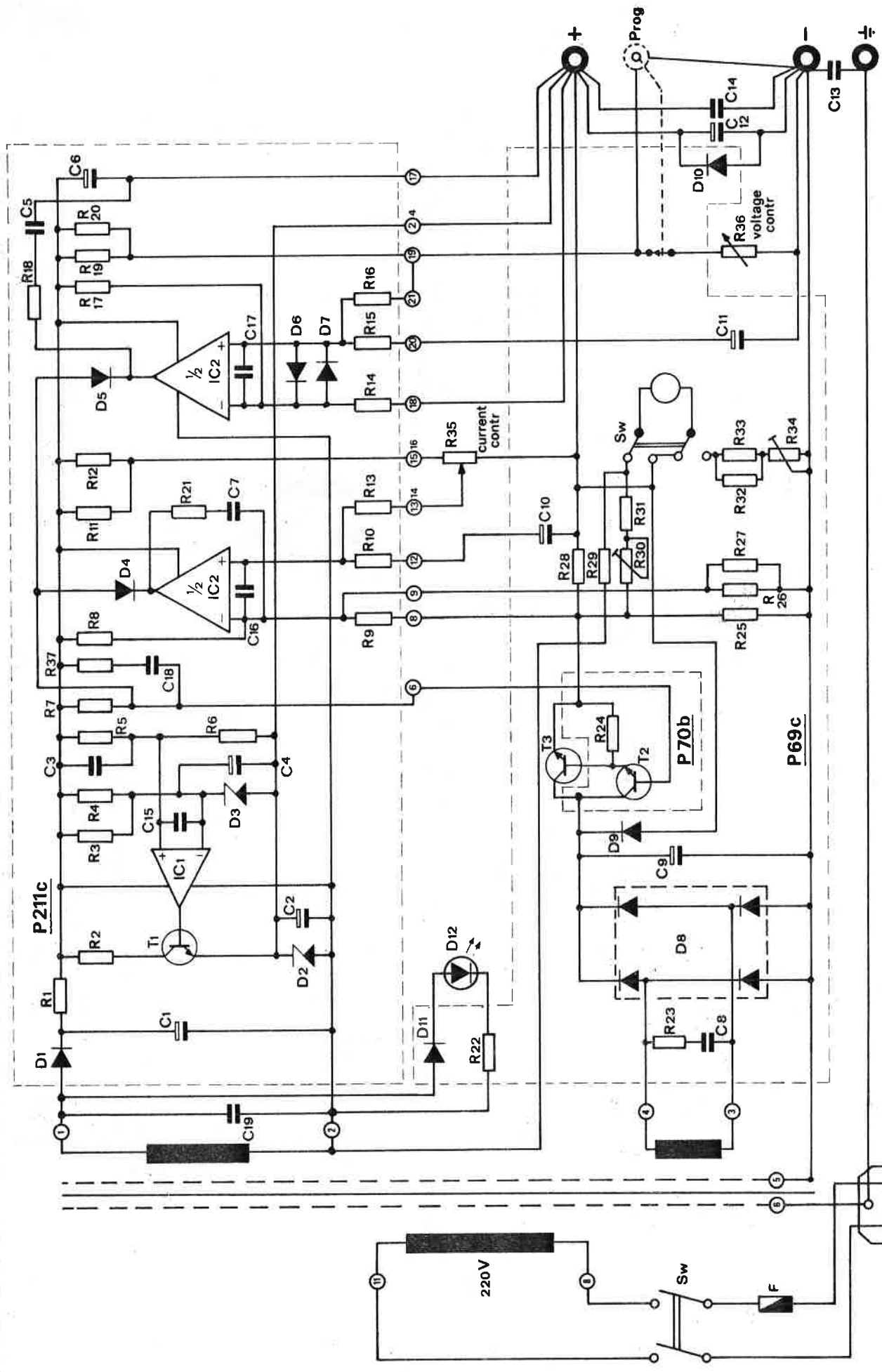
tt = tantalum

			Title: E015-2 E030-1 E060-0.6	
IC1,2	2.86	Vr	Date: Apr. '78	
Serial no. 14661 and up	2.82	Vr.		
Modifications	Date	App	delta elektronika bv	



Title: Wiring diagram Eois-2		Date: Apr. 78	
pc. boards		Date: Apr. 78	
Serial no 14661 and up		Date: Apr. 78	
Serial no 9708 and up		Date: Apr. 78	
Modifications		Date App	
2-86	Ur	2-82	Vr
JCI 2, D11, R32		delta elektronika by	





Title: E015-2 E030-1 Circuit diagram E060-06		Date: Apr '78	
Serial no 14661 and up	Serial no 9708 and up	Ur	Vr
Date App		2.86	2.82
Modifications		Ur	Vr
Date App		Apr '78	Apr '78
delta elektronika bv			

220V 50Hz