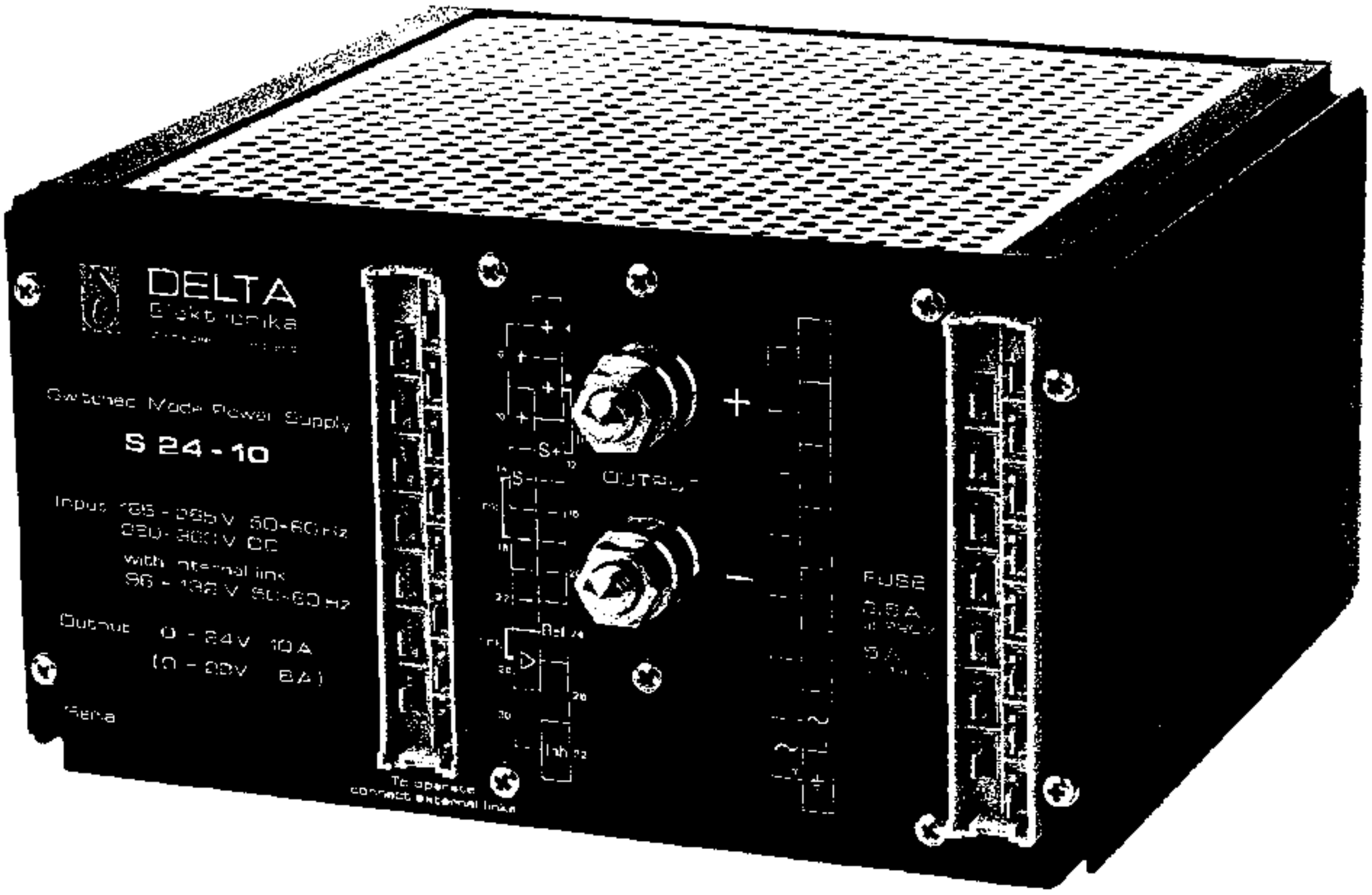
S 5 - 40
S 15 - 15
S 24 - 10

DELTA ELEKTRONIKA BV

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



SWITCHED MODE POWER SUPPLIES

Type	CV	CC	Adjustment range
S 5-40	0 - 5 V	0 - 40 A	0 - 6 V
S 15-15	0 - 15 V	0 - 15 A	0 - 18 V
S 24-10	0 - 24 V	0 - 10 A	0 - 30 V

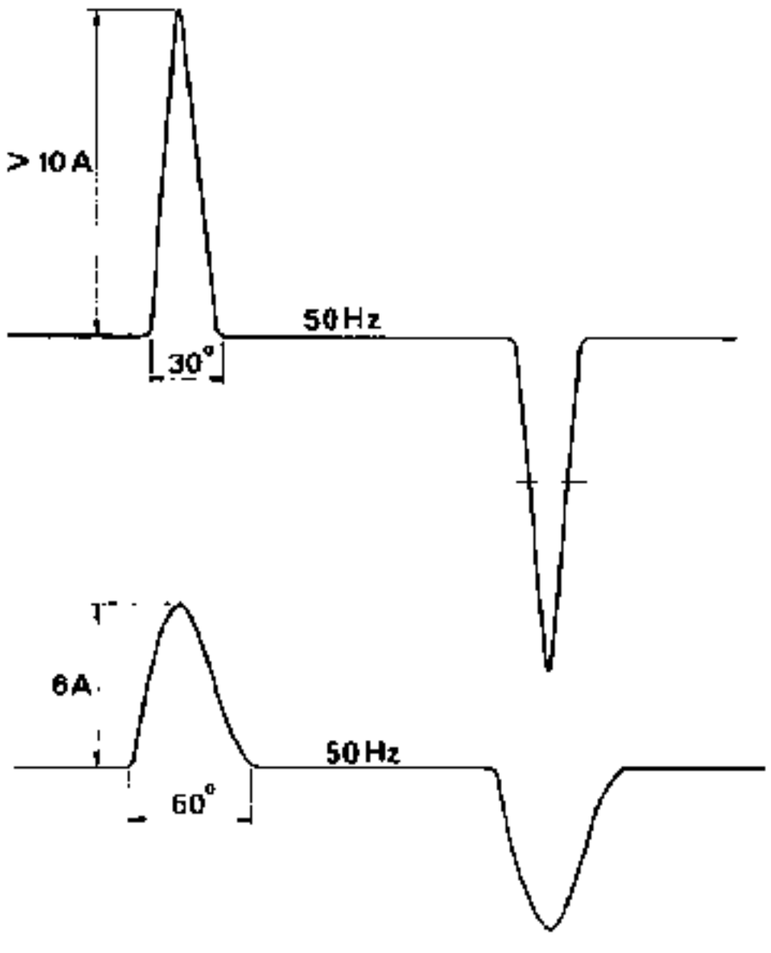
High efficiency: Typical 76 % at 5 V 40 A and 86 % at 24 V 10 A

Wide input voltage range: 185-265 V 50-60 Hz or 250-360 V DC

Or after connecting an internal link: 96-132 V 50-60 Hz

Soft start circuit for low inrush current during switch on.

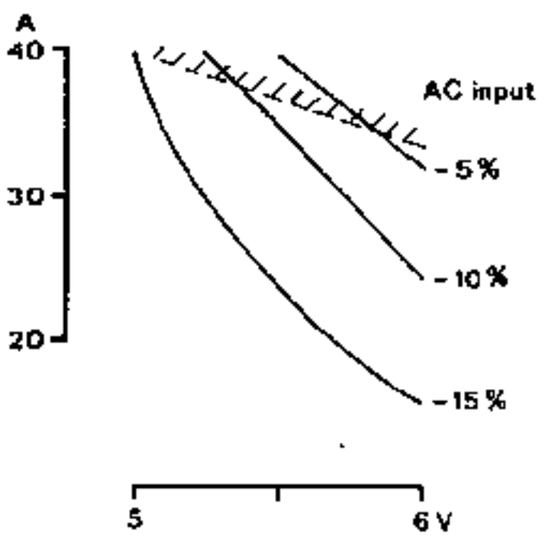
Choke input to improve the wave-form of the input current during operation.
Because of the nature of the off line rectifying circuit used in an SMPS, high peak currents are taken from the mains which cause line frequency distortion. This low frequency distortion is not rejected by the RFI input filter. To overcome this problem, in the S-series an extra iron cored LF choke is used as well as the RFI filter.



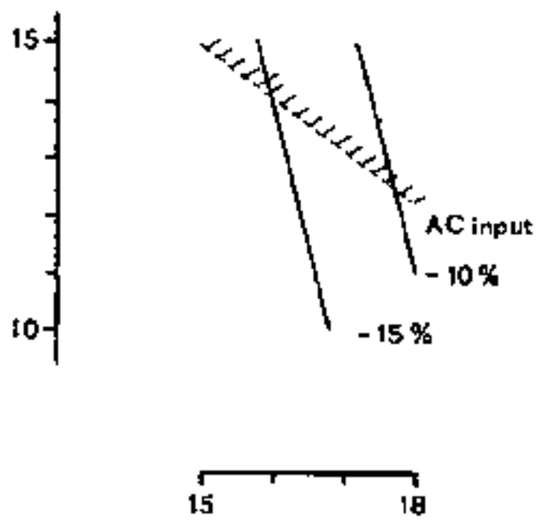
Input current of 240 W units of other manufacturers.

Input current of DELTA 240 W S-series.

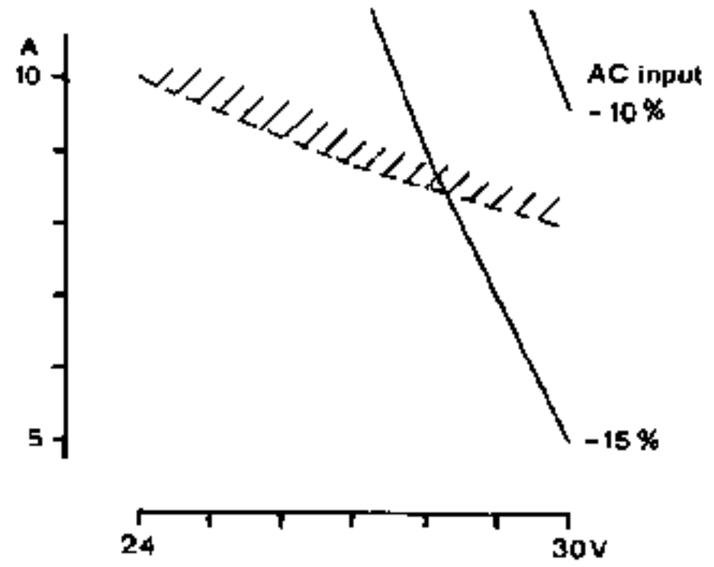
Maximum output current as function of the output voltage with lowest AC line



S 5 - 40

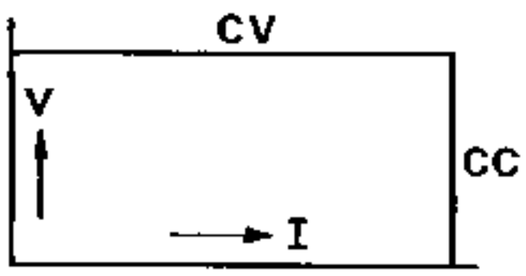


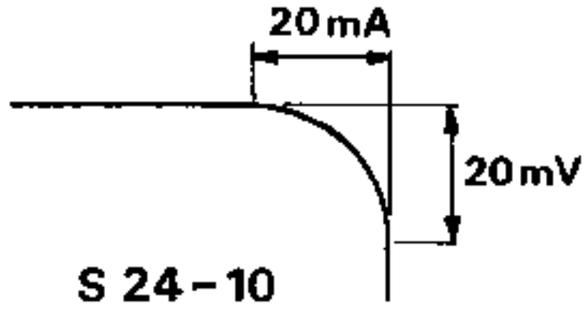
S 15 - 15



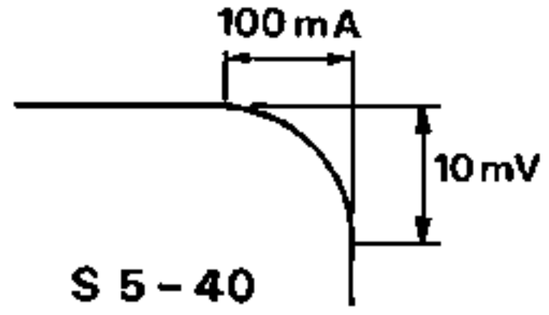
S 24 - 10

Constant Voltage / Constant Current regulation:





S 24 - 10



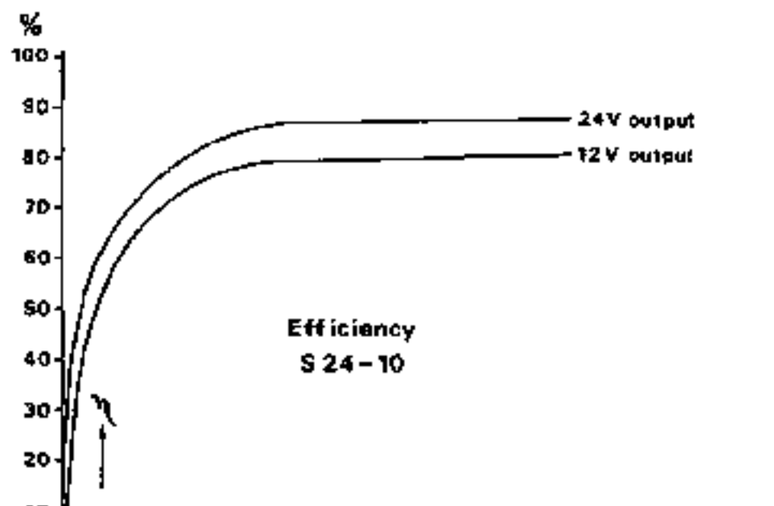
S 5 - 40

		CV	CC
Load regulation (0-100%)	:	10 mV	100 mA (S 5-40 200 mA)
Line regulation (185-265 V AC)	:	10 mV	50 mA (S 5-40 100 mA)
Ripple and noise RMS/p-p	:	20/50 mV	80/200 mA (S 5-40 200/500 mA)
Temperature coeff. per °C	:	1.10^{-4}	1.10^{-3}
Recovery time	:	0.5 mS for recovery to within 30 mV after a load step from 10 to 100 %	
Output impedance at 100 kHz	:	0.1 Ohm	

Efficiency:

Typical 86% at 24 V 10 A
80% at 15 V 15 A
76% at 5 V 40 A
The efficiency is practically independent of the input voltage and still very good at lower output voltages and currents.

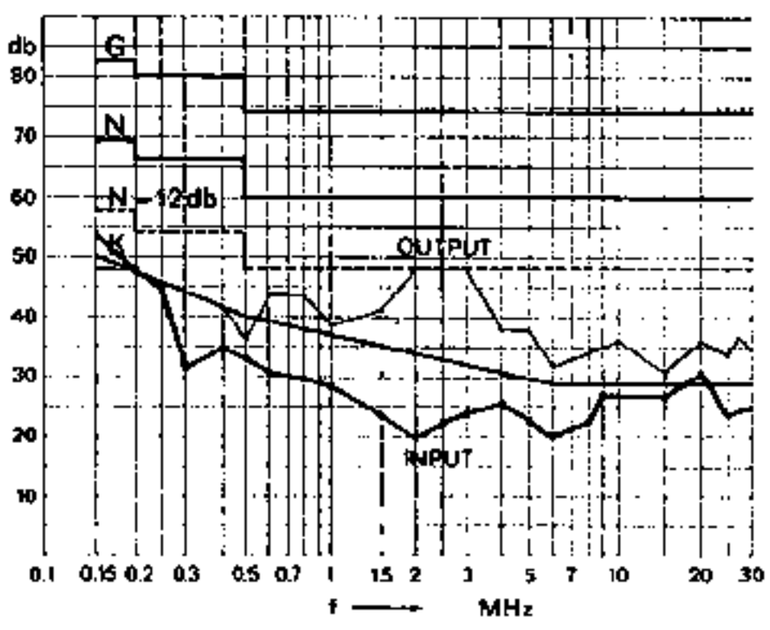
Input power at no load is about 6 Watts.



RFI suppression:

According to VDE 0875
N-12 db on input
N on output

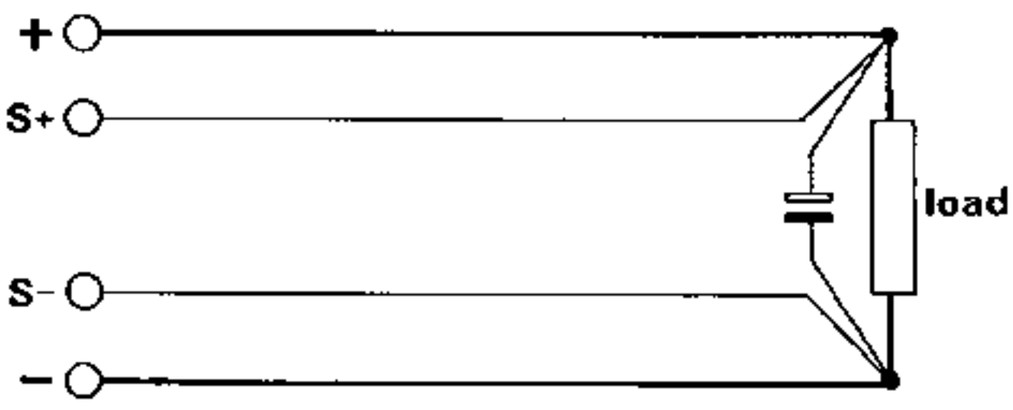
Typical RFI suppression measured at the input of the S-series.



Hold-up time: An input voltage interruption of 35 mS max. (at 220 V AC) does not affect the output voltage.

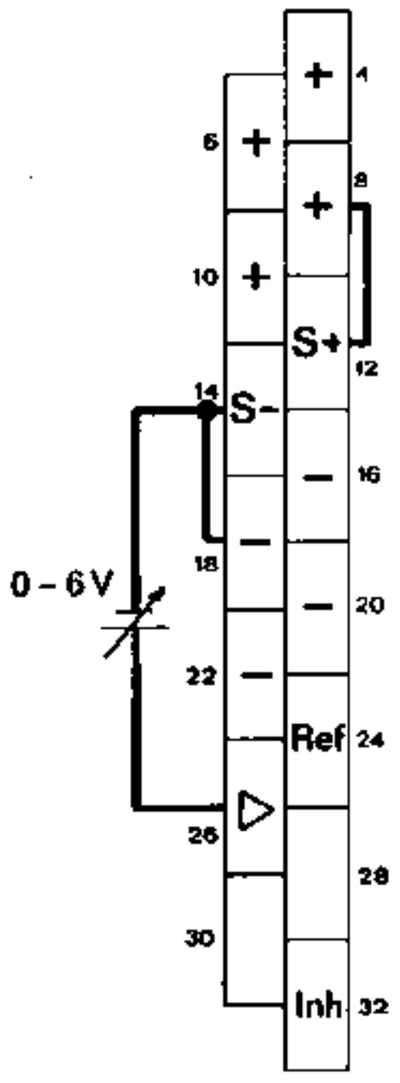
Remote sensing:

Connections are provided for remote sensing at the load point. The Voltage drop should not exceed 1V per load line. The OVP has to be set higher accordingly.

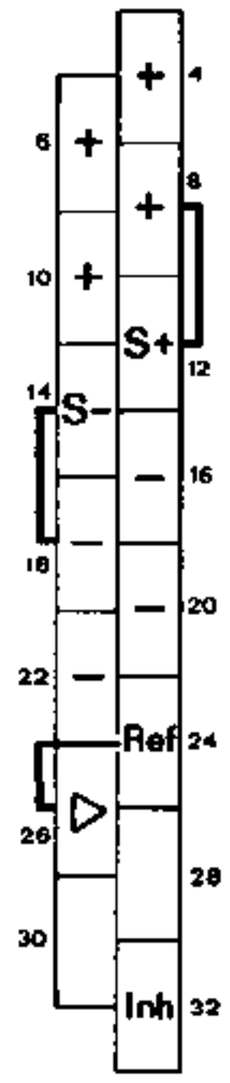


Remote programming:

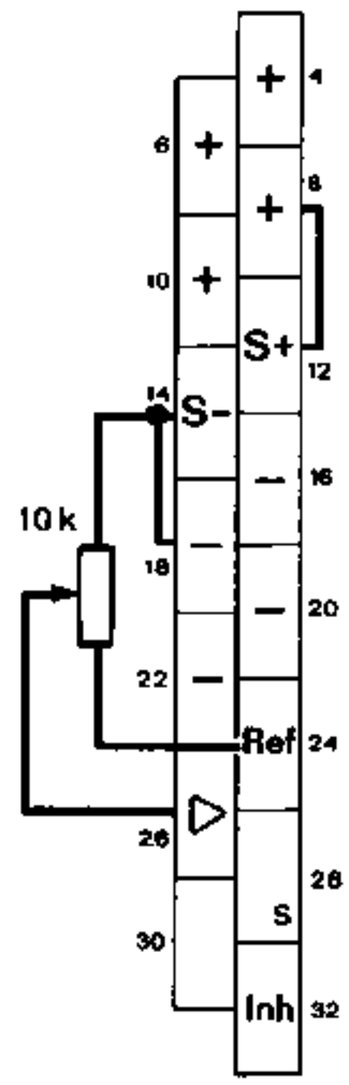
The output voltage can be programmed by an external programming voltage.
The programming voltage ranges from 0 to approximately 6 V for full output swing.
To program voltage by voltage remove the link between pin 24 and pin 26 and connect the positive side of the programming voltage to pin 26 and the negative side to pin 14. The max. programming speed is 300 V/sec. However the electrolytic output capacitors will overheat at a combined high programming amplitude and repetition frequency.



Voltage programming by voltage



Internal voltage adjustment



External voltage adjustment

Logic inhibit function:

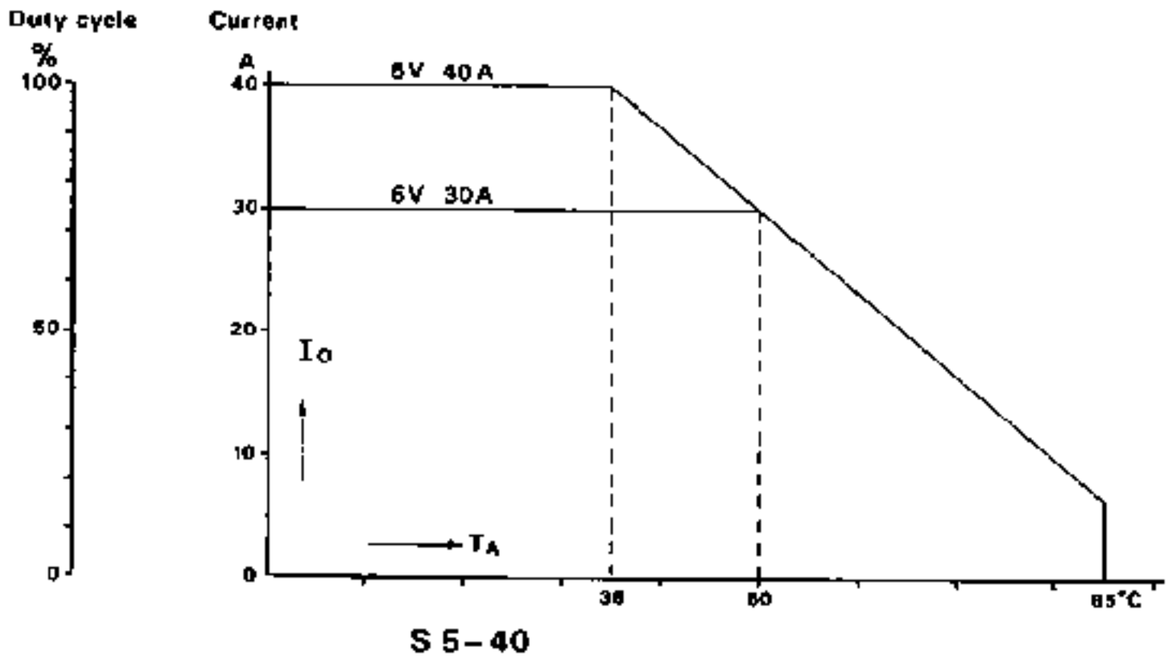
Logic 1 between INH (pin 32) and S- (pin 14) inhibits output.
Logic 0 between INH (pin 32) and S- (pin 14) enables output.

Parallel and series connection:
Is allowed up to 250 V combined sum

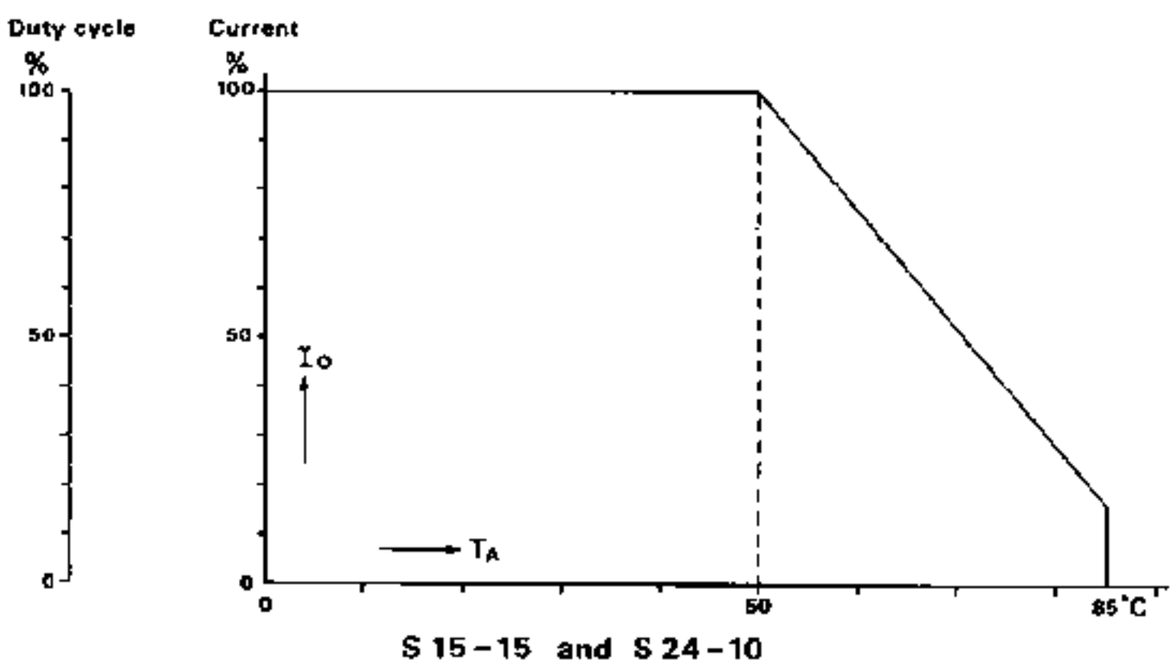
Adjustment of voltage, current and OVP:
By 20-turn screw adjustment through top cover

Led lamp on front panel indicates output state.

Current derating as function of ambient temperature and duty cycle:



S 5-40



S 15-15 and S 24-10

At a duty cycle lower than 100 % full output current is allowed at a higher ambient temperature. Restriction on duty cycle is: Max. on time 15 min.

Thermal shut down: At thermal overload the output shuts down.

Overload protection: May continuously be overloaded or short circuited.

Overvoltage protection: An electronic overvoltage protection shuts down the output if it exceeds the set value. The adjustment range is 5-35 V.

Delay caused by soft start: The output is available approximately 250 mS after switch-on.

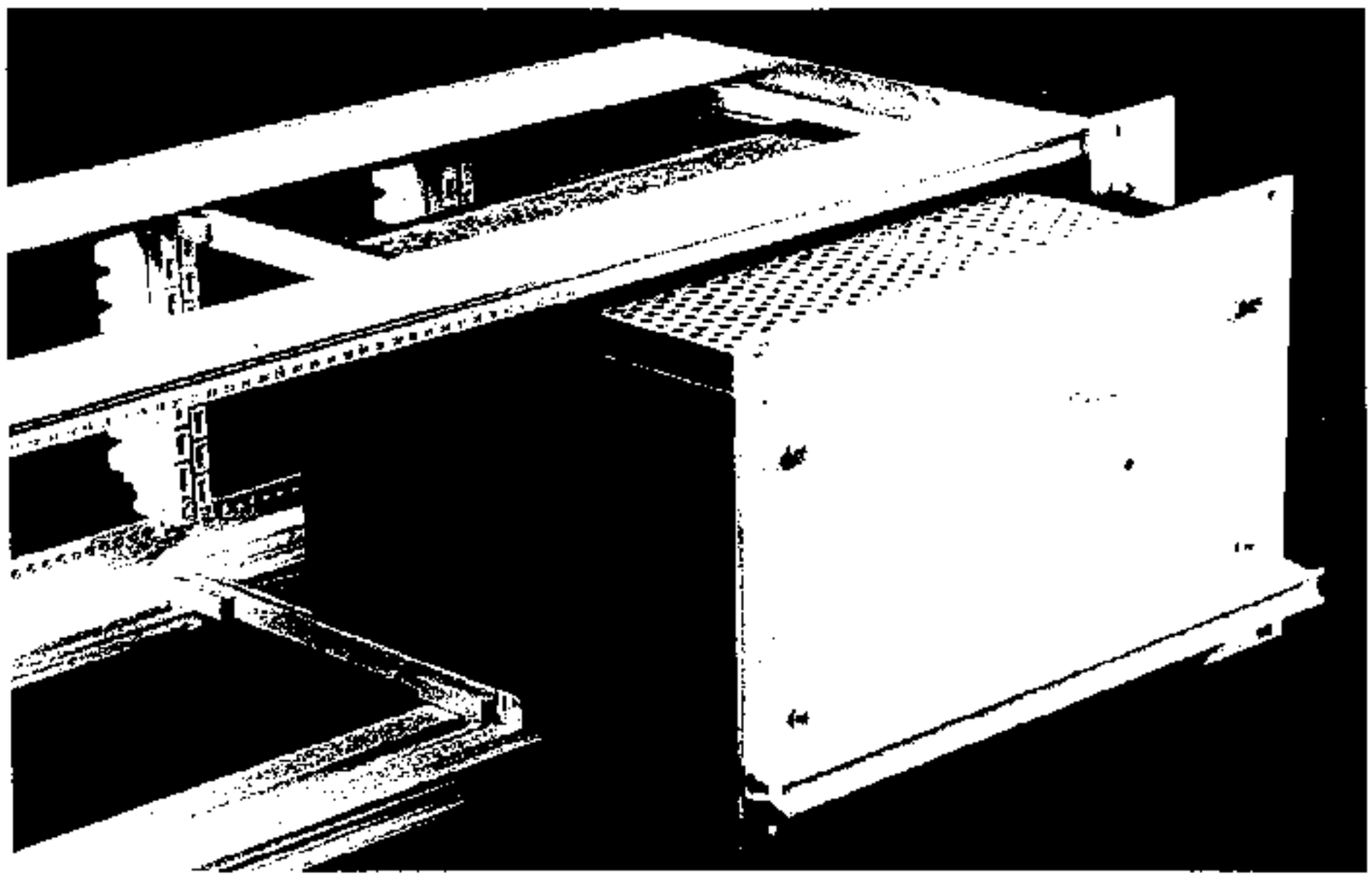
Insulation:	Test voltage	Resistance (measured at 500 V)
Input - output	2.5 kV RMS (1 minute)	50 MOhm
Input - case	2.5 kV RMS (1 minute)	50 MOhm
Output - case	500 V RMS (1 minute) 500 V DC (continuously)	50 MOhm

Input current: At full load 1.8 A RMS at 220 V 50 Hz Fuse 2.5 A slow blow
3.4 A RMS at 110 V 50 Hz Fuse 5.0 A slow blow

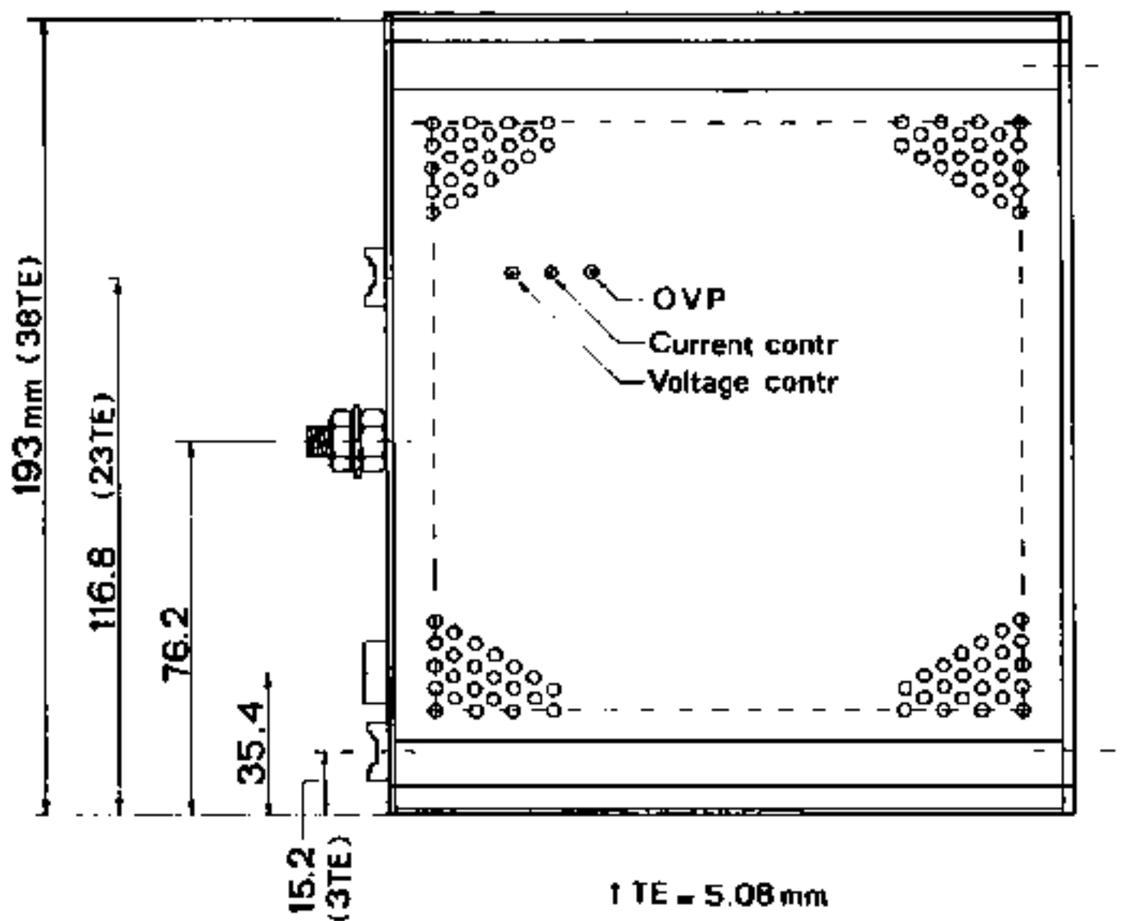
Weight: 2,75 Kg.

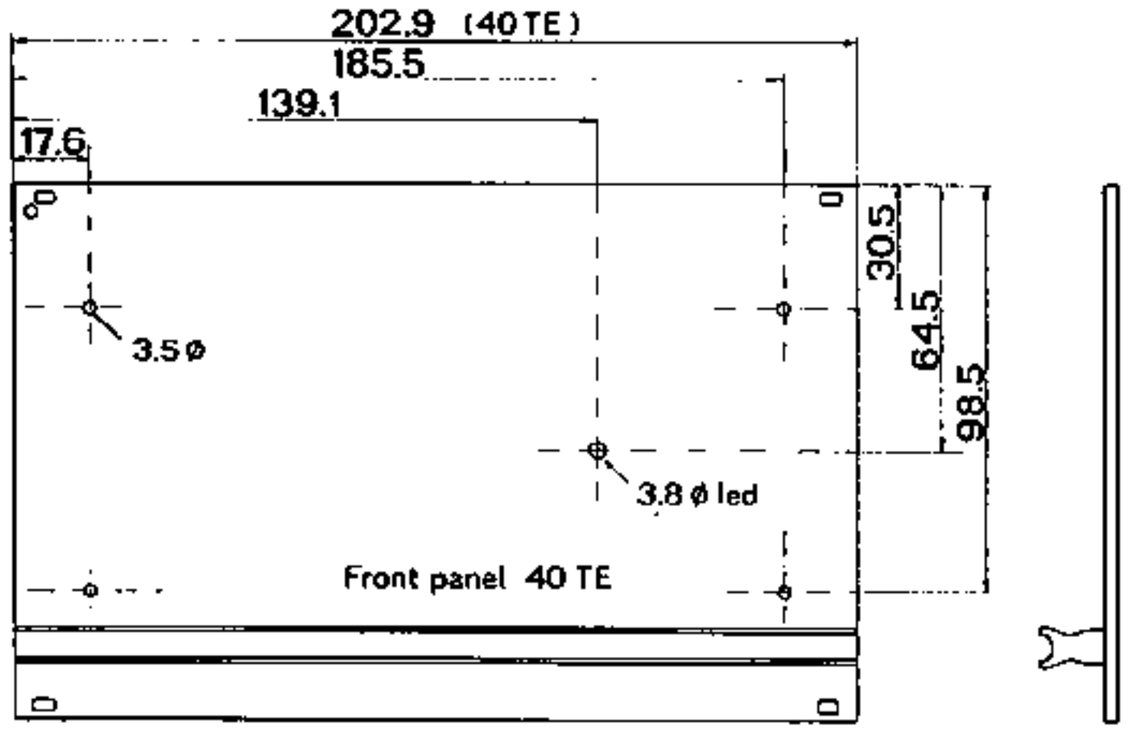
Dimensions: Europa cassette 38 TE width, 194,5 x 106 x 166 mm (W x H x D).
Separate 40 TE front panel available.

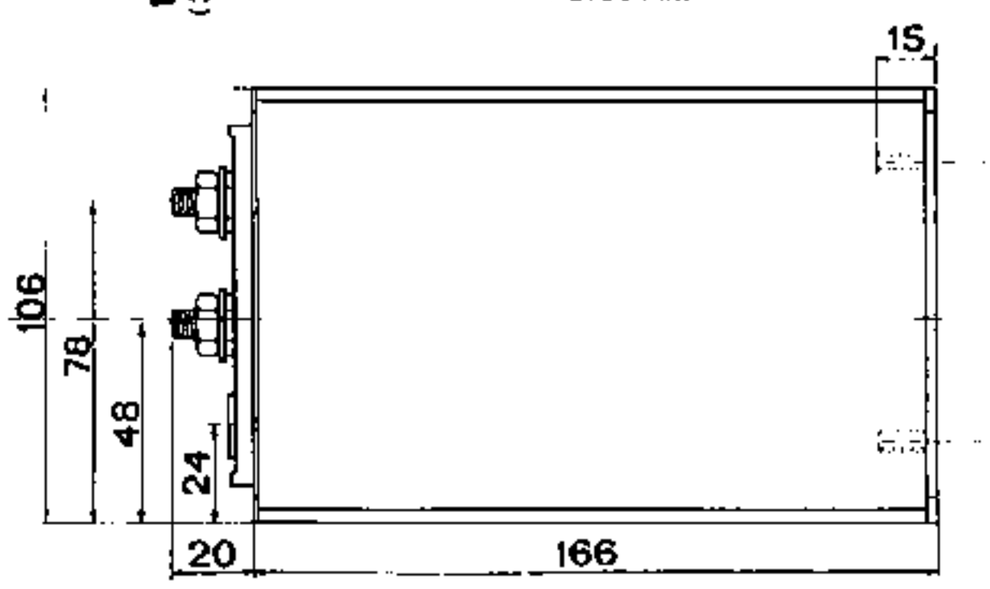
Mounting: Horizontal in order to allow a vertical air flow through the unit;
a requirement for natural convection cooling.

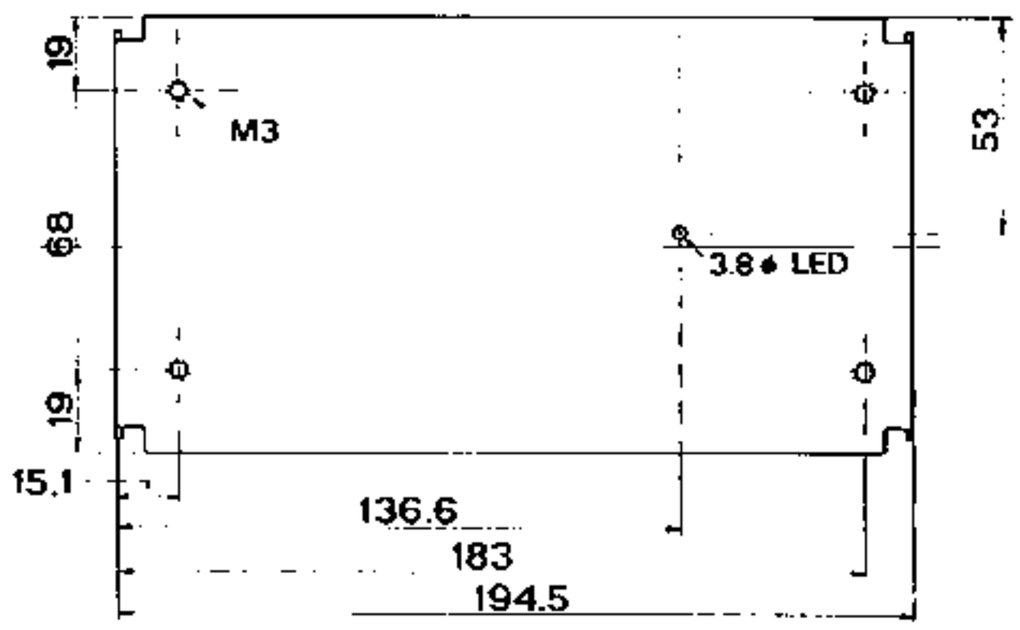


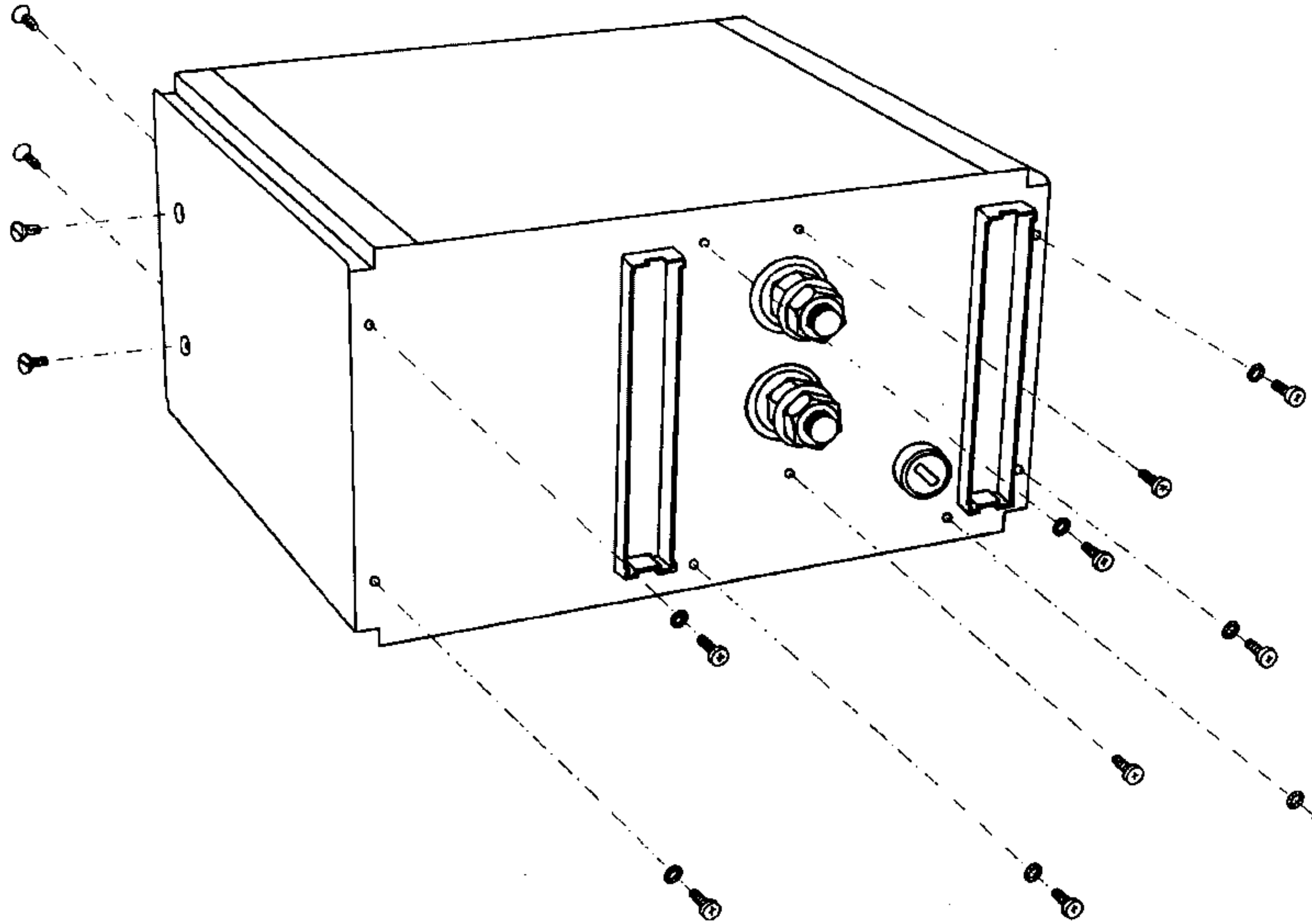
The 240 W S-series fits into a 19" Europa card rack.
The width is 38 TE.
A 40 TE front panel can be ordered separately.



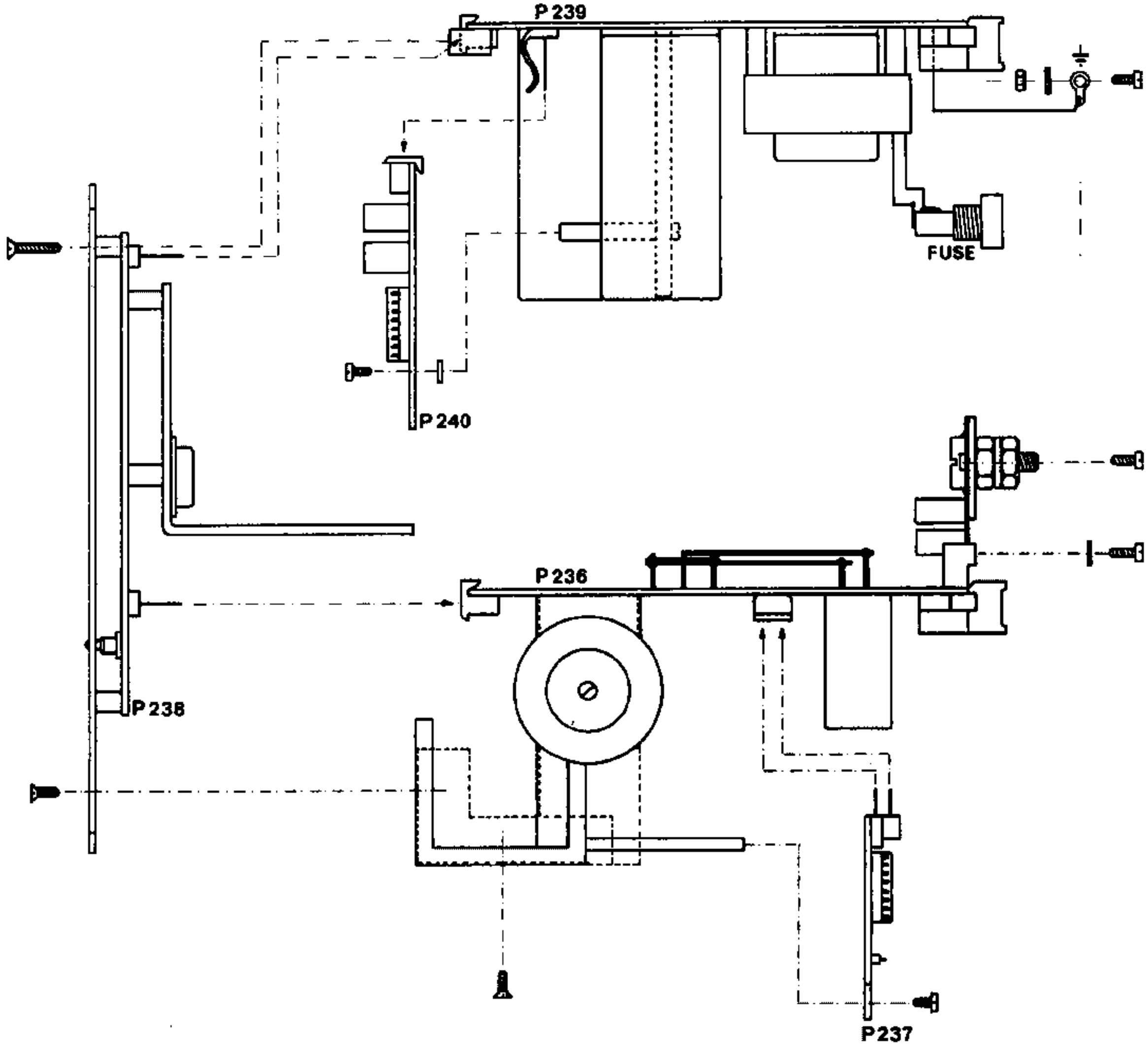








			Title: ext fixings assembly
			S 5-40, S 15-15, S 24-10
			Date: 6-'80
Modifications	Date	App	delta elektronika bv



			Title: assembly diagram S 5-40, S 15-15, S 24-10
			Date: 2-'80
Modifications	Date	App	delta elektronika bv

	S 5-40		S 15-15		S 24-10	
R = Ohm						
1 =	47	7 W WW	47	7 W WW	47	7 W WW
2 =	390		390		390	
3 =	270		270		270	
4 =	270		270		270	
5 =	4,7		4,7		4,7	
6 =	22		22		22	
7 =	1,2 k	10 W WW	1,2 k	10 W WW	1,2 k	10 W WW
8 =	8,2		3,9		3 x 100	PR 37
9 =	560		560		560	
10 =	CR		CR		CR	
11 =	330		330		330	
12 =	10 k	potm. 20 trn.	10 k	potm. 20 trn.	10 k	potm. 20 trn.
13 =	470		470		470	
14 =	0,00075		0,002		0,003	
15 =	1 k	potm. 20 trn.	1 k	potm. 20 trn.	1 k	potm. 20 trn.
16 =	1 k		1 k		1 k	
17 =	330		330		330	
18 =	100		1 k		3,3 k	
19 =	330		330		330	
20 =	68 k		68 k		68 k	
21 =	56 k		56 k		56 k	
22 =	CR		CR		CR	
23 =	1 k		1 k		1 k	
24 =	560 k		560 k		560 k	
25 =	270 k		270 k		270 k	
26 =	82 k	0,7 W	82 k	0,7 W	82 k	0,7 W
27 =	82 k	0,7 W	82 k	0,7 W	82 k	0,7 W
28 =	-		-		-	
29 =	680		680		680	
30 =	12 k		12 k		12 k	
31 =	68 k		68 k		68 k	
32 =	15 k		15 k		15 k	
33 =	1 k		1 k		1 k	
34 =	820		820		820	
35 =	3,3 k		3,3 k		3,3 k	
36 =	39		39		39	
37 =	10 k		10 k		10 k	
38 =	—		—		—	
39 =	—		—		—	
40 =	10		10		10	
41 =	6,8 k		6,8 k		6,8 k	
42 =	CR		CR		CR	
43 =	CR		CR		CR	
44 =	22 k		22 k		22 k	
45 =	33 k		33 k		33 k	
46 =	1 k		1 k		1 k	
47 =	1 k		1 k		1 k	
48 =	470		470		470	
49 =	100 k		100 k		100 k	
50 =	1 k		1 k		1 k	
51A =	150 k		150 k		150 k	
52A =	150 k		150 k		150 k	

Modifications	Date	App	Title: Part list
R34 = 820 Ω / R48 = 470 Ω	7-'86	U	
R8 (S24-10)	6-'85	U	Date: 6-'80
			delta elektronika bv

	S 5-40		S 15-15		S 24-10	
R = Ohm						
51 =	1	k	1	k	1	k
52 =	12	k	12	k	12	k
53 =	180	k	270	k	270	k
54 =	CR		CR		CR	
55 =	2,7	k	8,2	k	12	k
56 =	1	k	1	k	1	k
57 =	1	k	1	k	1	k
58 =	15	k	4,7	k	3,3	k
59 =	82	k	27	k	56	k
60 =	4,7	k	4,7	k	4,7	k
61 =	680		680		680	
62 =	2,7	k	2,7	k	2,7	k
63 =	150		150		150	
64 =	5	k potm. 20 trn.	5	k potm. 20 trn.	5	k potm. 20 trn
65 =	1	k	1	k	1	k
66 =	4,7		4,7		4,7	
67 =	CR		CR		CR	
68 =	CR		CR		CR	
69 =	10	k	10	k	10	k
70 =	1,2	k 10 W WW	1,2	k 10 W WW	1,2	k 10 W WW
71 =	12		-		-	
72 =	100		100		100	
73 =	2,2	k	2,2	k	2,2	k
74 =	—		—		—	
75 =	2,2	k	2,2	k	2,2	k

CR = Calibration resistor
WW = wire wound
all other resistors 0,4W 2% metal film

T 1 =	BUX 98		BUX 98		BUX 98	Sescosem
2 =	2 N 2907 A		2 N 2907 A		2 N 2907 A	Sescosem
3 =	2 N 3053		2 N 3053		2 N 3053	RCA
4 =	BUX 86		BUX 86		BUX 86	Philips
5 =	2 N 2222 A		2 N 2222 A		2 N 2222 A	Sescosem
6 =	2 N 2907 A		2 N 2907 A		2 N 2907 A	Sescosem
7 =	BS 250		BS 250		BS 250	J.M.
8 =	VN 66 AF		VN 66 AF		VN 66 AF	Siliconix
9 =	VN 66 AF		VN 66 AF		VN 66 AF	Siliconix
10 =	2 N 2907 A		2 N 2907 A		2 N 2907 A	Sescosem
11 =	2 N 2222 A		2 N 2222 A		2 N 2222 A	Sescosem
12 =	2 N 2907 A		2 N 2907 A		2 N 2907 A	Sescosem
13 =	2 N 2907 A		2 N 2907 A		2 N 2907 A	Sescosem
IC						
1 =	HEF 4049 BP		HEF 4049 BP		HEF 4049 BP	Philips
2 =	HEF 4049 BP		HEF 4049 BP		HEF 4049 BP	Philips
3 =	TL 082 IP		TL 082 IP		TL 082 IP	TI

Modifications	Date	App.
Bux 48 = Bux 98	4-'86	Vr.
JC3 (P2374)	2-'86	Vr
T7, R74	1-'84	Vr
R55, 59, 62, 63, 75	5-'83	Vr

Title: Part list

Date: 6-'80

delta elektronika bv

C	S 5-40			S 15-15			S 24-10		
1 =	0,22	µF	250 V ~ X	0,22	µF	250 V ~ X	0,22	µF	250 V ~ X
2 =	4,7	nF	250 V ~ Y	4,7	nF	250 V ~ Y	4,7	nF	250 V ~ Y
3 =	0,22	µF	250 V ~ X	0,22	µF	250 V ~ X	0,22	µF	250 V ~ X
4 =	4,7	nF	250 V ~ Y	4,7	nF	250 V ~ Y	4,7	nF	250 V ~ Y
5 =	800	µF	200 V -	800	µF	200 V -	800	µF	200 V -
6 =	800	µF	200 V -	800	µF	200 V -	800	µF	200 V -
7 =	0,1	µF	400 V -	0,1	µF	400 V -	0,1	µF	400 V -
8 =	1	µF	250 V -	1	µF	250 V -	1	µF	250 V -
9 =	4,7	µF	63 V -	4,7	µF	63 V -	4,7	µF	63 V -
10 =	1,8	nF	2000 V -	1,8	nF	2000 V -	1,8	nF	2000 V -
11 =	10	nF	500 V -	10	nF	500 V -	3300	pF	1000 V -
12 =	10	nF	250 V -	10	nF	250 V -	10	nF	250 V -
13 =	4700	µF	16 V -	2200	µF	40 V -	1000	µF	63 V -
14 =	4700	µF	16 V -	2200	µF	40 V -	1000	µF	63 V -
15 =	15	µF	16 V -	15	µF	16 V -	15	µF	16 V -
16 =	15	µF	16 V -	15	µF	16 V -	15	µF	16 V -
17 =	0,22	µF	63 V -	0,22	µF	63 V -	0,22	µF	63 V -
18 =	4700	µF	16 V -	2200	µF	40 V -	1000	µF	63 V -
19 =	0,22	µF	63 V -	0,22	µF	63 V -	0,22	µF	63 V -
20 =	15	µF	16 V -	15	µF	16 V -	15	µF	16 V -
21 =	15	µF	16 V -	15	µF	16 V -	15	µF	16 V -
22 =	0,22	µF	250 V ~ X	0,22	µF	250 V ~ X	0,22	µF	250 V ~ X
23 =	1	µF	63 V -	1	µF	63 V -	1	µF	63 V -
24 =	0,22	µF	250 V ~ X	0,22	µF	250 V ~ X	0,22	µF	250 V ~ X
25 =	0,22	µF	63 V -	0,22	µF	63 V -	0,22	µF	63 V -
26 =	0,1	µF	400 V -	0,1	µF	400 V -	0,1	µF	400 V -
27 =	15	pF	500 V -	15	pF	500 V -	15	pF	500 V -
28 =	150	pF	630 V -	150	pF	630 V -	150	pF	630 V -
29 =	470	pF	160 V -	470	pF	160 V -	470	pF	160 V -
30 =	100	µF	10 V -	100	µF	10 V -	100	µF	10 V -
31 =	10	nF	250 V -	10	nF	250 V -	10	nF	250 V -
32 =	150	pF	1600 V -	150	pF	1600 V -	150	pF	1600 V -
33 =	47	µF	40 V -	47	µF	40 V -	47	µF	40 V -
34 =	15	µF	16 V -	15	µF	16 V -	15	µF	16 V -
35 =	1	nF	630 V -	1	nF	630 V -	1	nF	630 V -
36 =	1000	pF	630 V -	1000	pF	630 V -	1000	pF	630 V -
37 =	22	nF	250 V -	22	nF	250 V -	22	nF	250 V -
38 =	10	nF	250 V -	10	nF	250 V -	10	nF	250 V -
39 =	470	pF	160 V -	470	pF	160 V -	470	pF	160 V -
40 =	22	nF	250 V -	22	nF	250 V -	22	nF	250 V -
41 =	470	pF	160 V -	470	pF	160 V -	470	pF	160 V -
42 =	470	pF	160 V -	470	pF	160 V -	470	pF	160 V -
43 =	10	nF	250 V -	10	nF	250 V -	10	nF	250 V -
44 =	470	pF	160 V -	470	pF	160 V -	470	pF	160 V -
45 =	470	pF	160 V -	470	pF	160 V -	470	pF	160 V -
46 =	47	nF	250 V -	47	nF	250 V -	47	nF	250 V -
47 =	2,2	µF	16 V -	2,2	µF	16 V -	2,2	µF	16 V -
48 =	2,2	µF	16 V -	2,2	µF	16 V -	2,2	µF	16 V -
49 =	4,7	µF	63 V -	4,7	µF	63 V -	4,7	µF	63 V -
50 =	4,7	µF	63 V -	4,7	µF	63 V -	4,7	µF	63 V -

C36 (470 = 1000 pF)	3-87	Vn.	Title: Part list
C56, C39			
(C11, C55)	6-85	Vr	Date: 6-'80
Modifications	Date	App.	delta elektronika bv

	S 5-40			S 15-15			S 24-10		
C									
51 =	68	nF	250 V ~	68	nF	250 V ~	68	nF	250 V ~
52 =	2,2	µF	16 V -	2,2	µF	16 V -	2,2	µF	16 V -
53 =	2,2	µF	16 V -	2,2	µF	16 V -	2,2	µF	16 V -
54 =	2,2	nF	500 V -	—			—		
55 =	100	pF	500 V -	100	pF	500 V -	100	pF	500 V -
56 =	10	nF	50 V -	10	nF	50 V -	10	nF	50 V -
57 =	470	pF	500 V -	470	pF	500 V -	470	pF	500 V -
58 =	470	pF	500 V -	470	pF	500 V -	470	pF	500 V -

L 1	=	68 µH	Secré
S 75	=	prim. choke	delta
L 115	=	sec. choke 10 A	delta
L 116	=	sec. choke 15 A	delta
L 117	=	sec. choke 40 A	delta
T 120	=	aux. supply transformer	delta
T 124	=	curr. transformer	delta
L 126	=	sec. RFI inductance 5 V	delta
L 127	=	sec. RFI inductance 15 V, 24 V	delta
T 129	=	transformer 5 V	delta
T 130	=	transformer 15 V	delta
T 131	=	transformer 24 V	delta
L 132	=	saturable inductance	delta
L 134	=	prim. RFI inductance B 82724-G2-A013	Siemens
L 135	=	switch-off inductance 15 µH 22-26	secre
T 136	=	driver transformer	delta
L 228	=	saturable inductance	delta

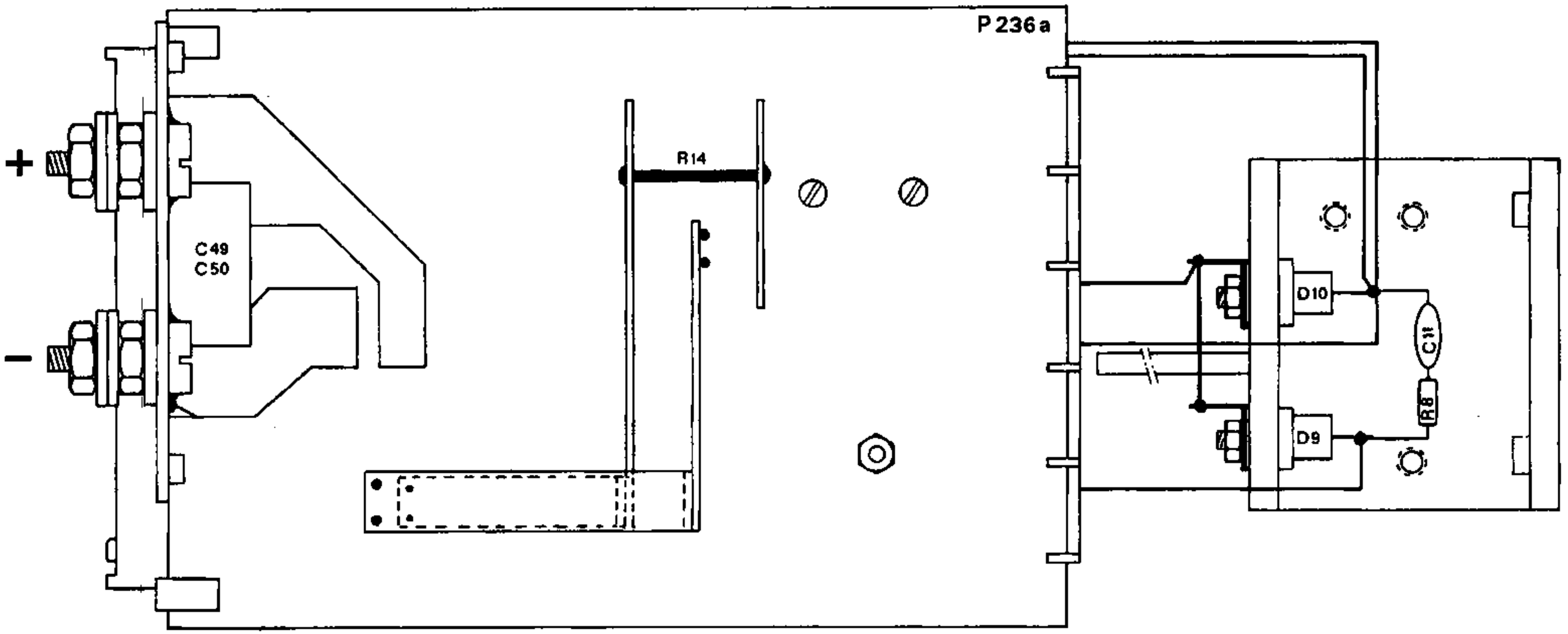
L1 (P237)	2-'86	Vr	Title: Part list
L 228 (S24-10)	6-'85	Vr	S 5-40, S 15-15, S 24-10
C57, 58	2-'85	Vr	Date: 6-'80
Modifications	Date	App.	delta elektronika bv

	S 5-40		S 15-15	S 24-10	
D					
1 =	BTA 08-600 S		BTA 08-600 S	BTA 08-600 S	Thom.
2 =	VJ 1048		VJ 1048	VJ 1048	Varo
3 =	BYV 96D		BYV 96D	BYV 96D	Philips
4 =	ZPY 6,2		ZPY 6,2	ZPY 6,2	ITT
5 =	BYT 12 P 800		BYT 12 P 800	BYT 12 P 800	Thom.
6 =	BYV 96D		BYV 96D	BYV 96D	Philips
7 =	BY 218-800		BY 218-800	BY 218-800	Sescosem
8 =	BY 218-800		BY 218-800	BY 218-800	Sescosem
9 =	VSK 51	Varo	BYW 92-150	BYW 77/180A	Thom.
10 =	VSK 51	Varo	BYW 92-150	BYW 77/180A	Thom.
11 =	1 N 4148		1 N 4148	1 N 4148	TI
12 =	-		-	-	
13 =	TL 431 ILP		TL 431 ILP	TL 431 ILP	TI
14 =	TIL 209 A		TIL 209 A	TIL 209 A	TI
15 =	1 N 4148		1 N 4148	1 N 4148	TI
16 =	ZPD 6,2		ZPD 6,2	ZPD 6,2	ITT
17 =	1 N 4148		1 N 4148	1 N 4148	TI
18 =	BYV 96D		BYV 96D	BYV 96D	Philips
19 =	BYV 96D		BYV 96D	BYV 96D	Philips
20 =	BZV 15 C 12		BZV 15 C 12	BZV 15 C 12	Philips
21 =	-		-	-	
22 =	BYV 96D		BYV 96D	BYV 96D	Philips
23 =	1 N 4148		1 N 4148	1 N 4148	TI
24 =	1 N 4148		1 N 4148	1 N 4148	TI
25 =	1 N 4148		1 N 4148	1 N 4148	TI
26 =	1 N 4148		1 N 4148	1 N 4148	TI
27 =	1 N 4148		1 N 4148	1 N 4148	TI
28 =	1 N 4148		1 N 4148	1 N 4148	TI
29 =	PO 102 BA		PO 102 BA	PO 102 BA	TAG
30 =	1 N 4148		1 N 4148	1 N 4148	TI
31 =	1 N 4148		1 N 4148	1 N 4148	TI
32 =	1 N 4148		1 N 4148	1 N 4148	TI
33 =	1 N 4148		1 N 4148	1 N 4148	TI
34 =	1 N 4148		1 N 4148	1 N 4148	TI
35 =	1 N 4148		1 N 4148	1 N 4148	TI
36 =	1 N 4148		1 N 4148	1 N 4148	TI
37 =	ZPD 5,6		ZPD 5,6	ZPD 5,6	ITT
38 =	ZPD 6,8		ZPD 6,8	ZPD 6,8	ITT
39 =	1 N 825		1 N 825	1 N 825	IR
40 =	ZPY 24		-	-	ITT
41 =	ZPY 24		-	-	ITT
42 =	ZPD 3,3		ZPD 3,3	ZPD 3,3	ITT
43 =	ZPD 12		ZPD 12	ZPD 12	ITT
44 =	1 N 4148		1 N 4148	1 N 4148	TI
45 =	ZPY 51		ZPY 51	ZPY 51	ITT
46 =	ZPY 51		ZPY 51	ZPY 51	ITT
47 =	BYV 96 D		-	-	Philips
48 =	BYV 96 D		-	-	Philips

F 1 = fuse 2,5A (220V) 5A (110V) type EAK 5 x 20 mm
F 2 = fuse 250 mA
F 3 = fuse 4A (little fuse)
TS = Thermostats OP 62 - 90 °C ± 5%

Modifications	Date	App.	
D1 (T1800D = BTA 08-600)	3-'87	Vr.	Title: Part list
D47, 48 (S 5-40)	1-'86	Vr	
D5	2-'85	Vr	Date: 6-'80
			delta elektronika bv

P 236 a



R74	1-'84	Vr	Title: PC board
R74	5-'82	Vr	S 15-15
P 236 a	4-'81	Vr.	Date: 2 - '80
Modifications	Date	App	delta elektronika bv

P236a

R16 C21 C16 R59 R58 C13 Ts T129 (5V) D9 D47 D40 C54

C19 R19 C25 C17 C46 C14 D10 D48 D41 R8 C11 R71

C24 L126 (5V) C20 C15 R55 R17

C23 C18 Link for int.I prog

C22 R64 R18 R15 R12 R11 R10 L117 (5V)

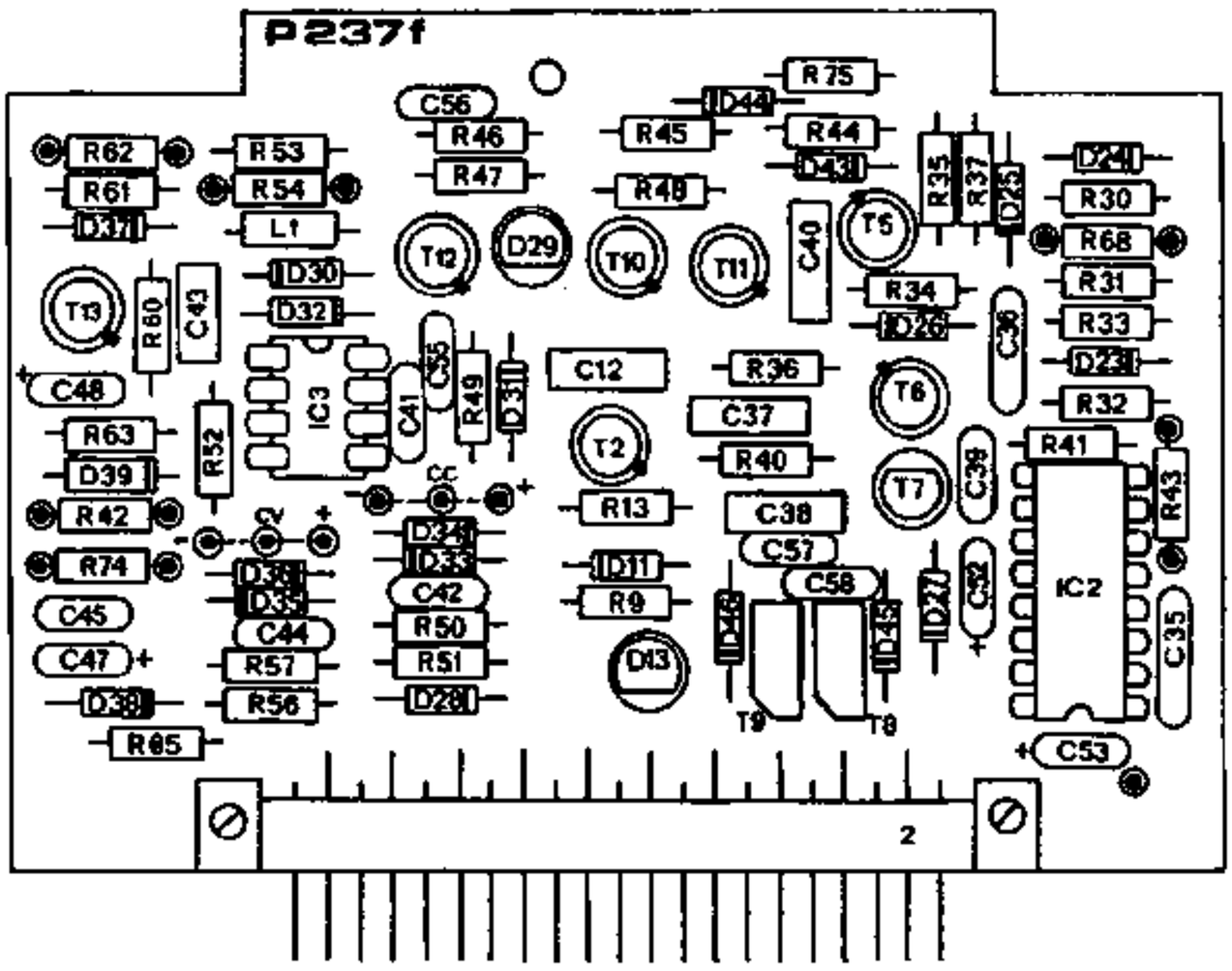
V I ovp

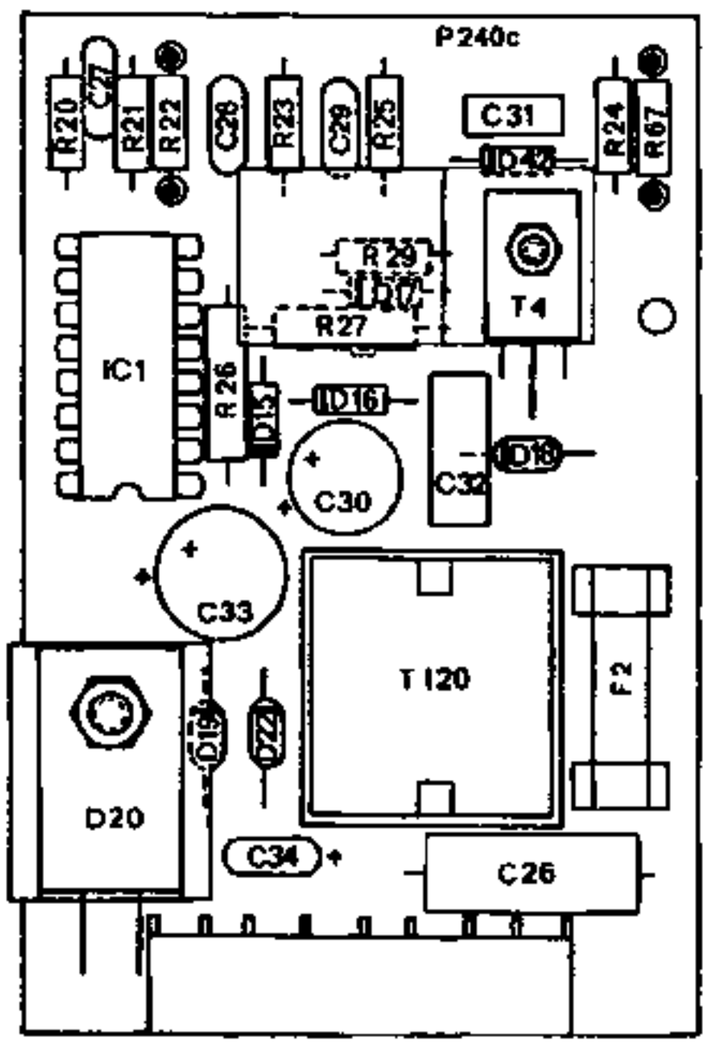
ovp adj

current adj

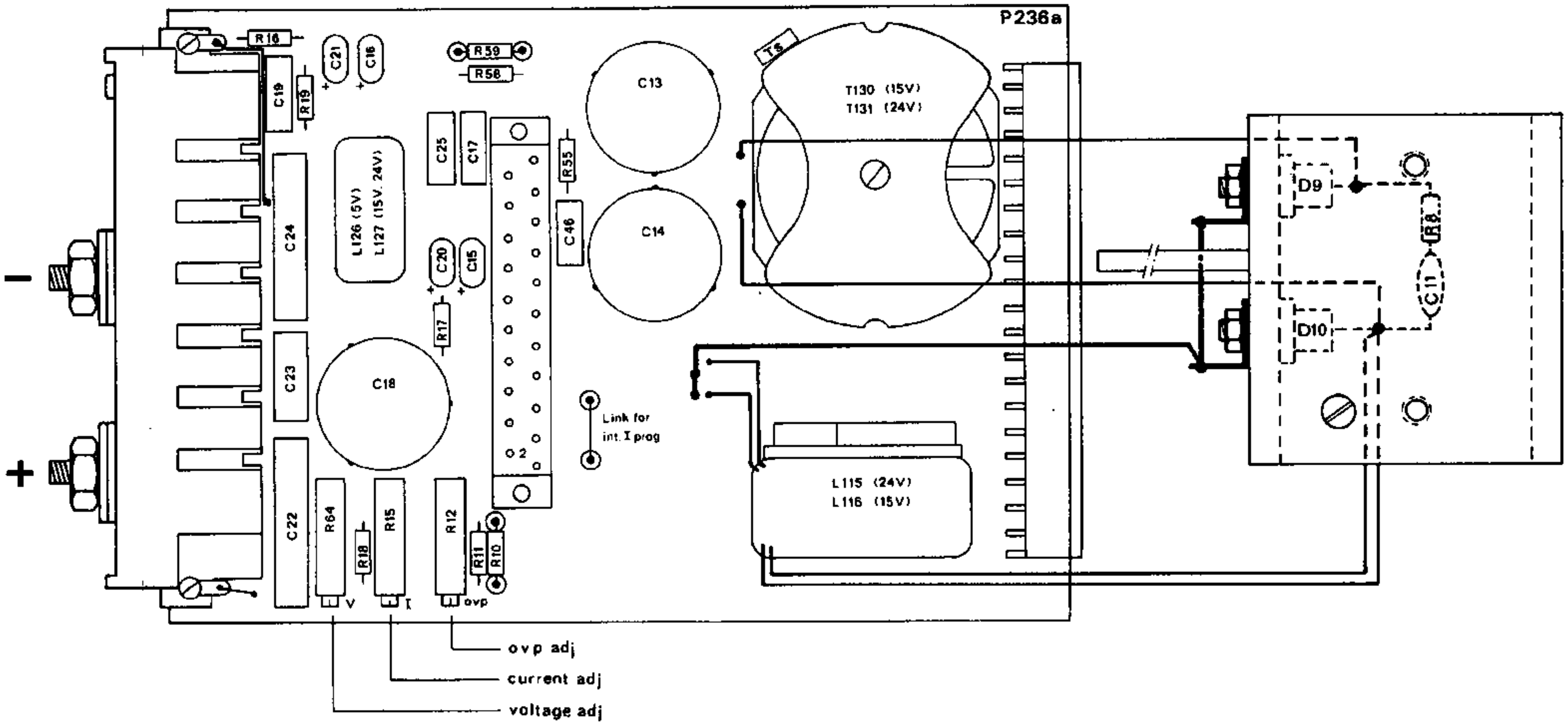
voltage adj

			Title: PC board S 5 - 40
D47, 48	1-'86	U.	Date: 2 - '80
Modifications	Date	App	delta elektronika bv

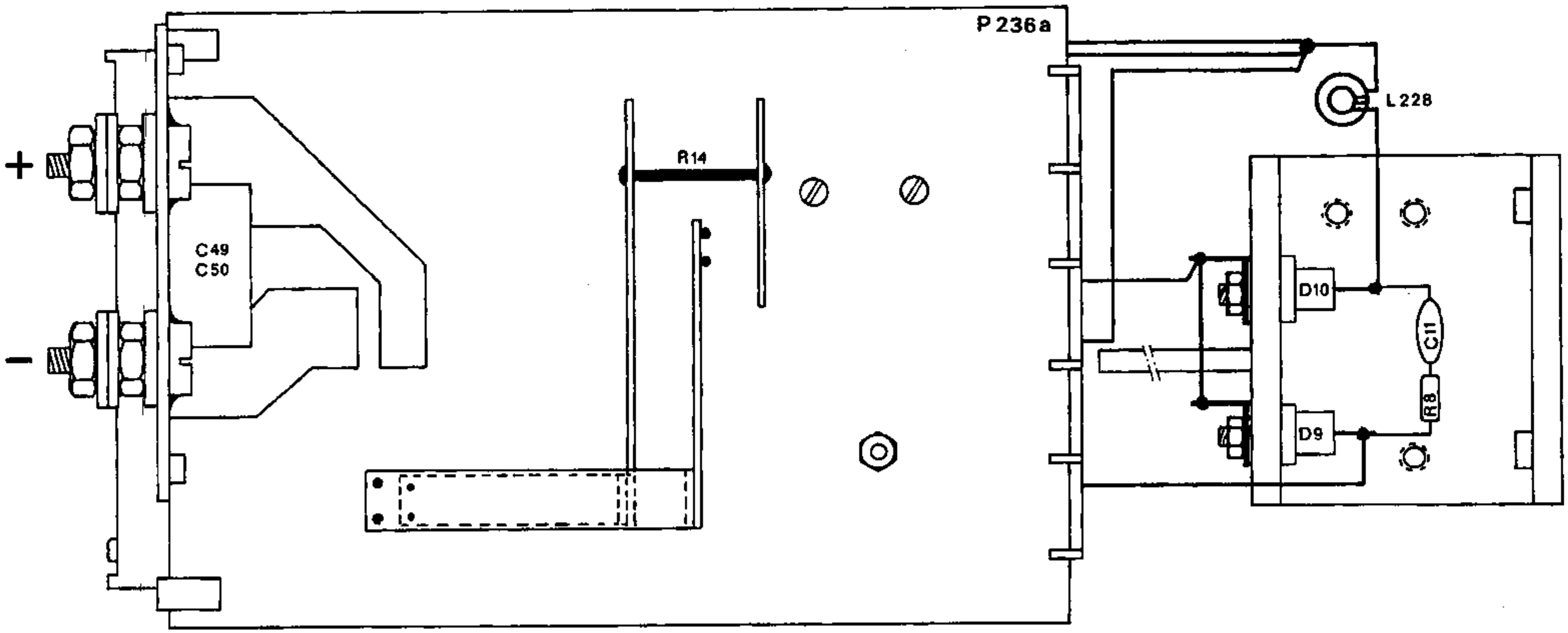




			Title: PC boards
			S5-40, S15-15, S24-10
P237f: (L1, IC3)	2.86	V+	Date: 8-'80
Modifications	Date	App.	delta elektronika bv



			Title: PC board S15 - 15
P236a	4-'81	Vr.	Date: 2 -'80
Modifications	Date	App	delta elektronika bv



			Title: PC board S 24 - 10
L 228	6-'85	Vr.	Date: 2 -'80
Modifications	Date	App.	delta elektronika bv

P236a

R16 C21 C16 R59 R56 C19 R19 C13 T1 T129 (5V) T130 (15V) T131 (24V) C25 C17 R55 L126 (5V) L127 (15V, 24V) C24 C46 C14 C20 C15 R17 C23 C18 C22 R64 R18 R15 R12 R11 R10 V I ovp 2

Link for int. I prog

L115 (24V) L116 (15V) L117 (5V)

D9 C11 R8 D10 L228

ovp adj

current adj

voltage adj

			Title: PC board S24 - 10
L228	6-'85	Vr.	Date: 2 -'80
Modifications	Date	App	delta elektronika bv

P 236a

+

−

C 49
C 50

R14

D10

D48

D41

C11

R71

C54

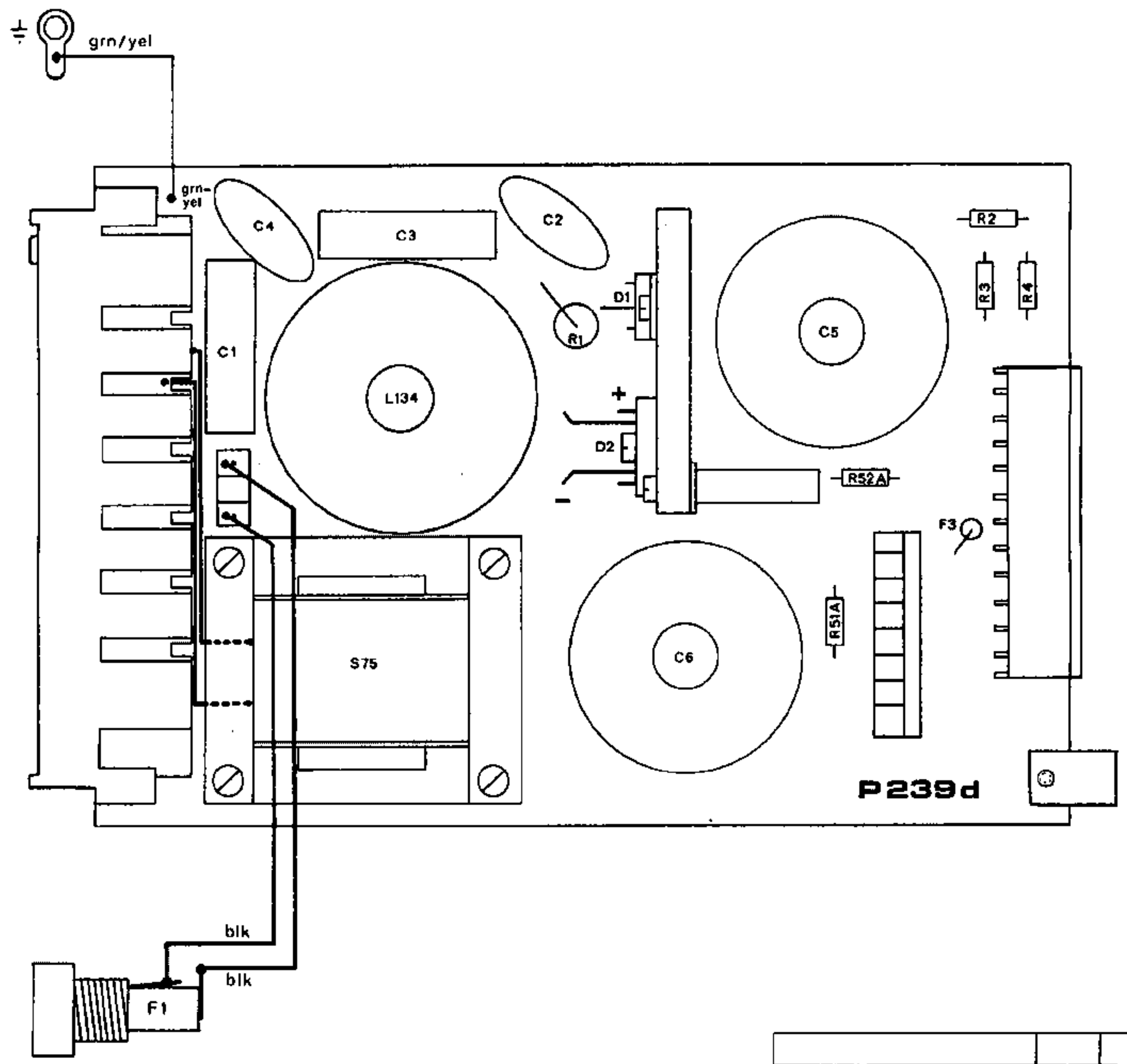
D9

R8

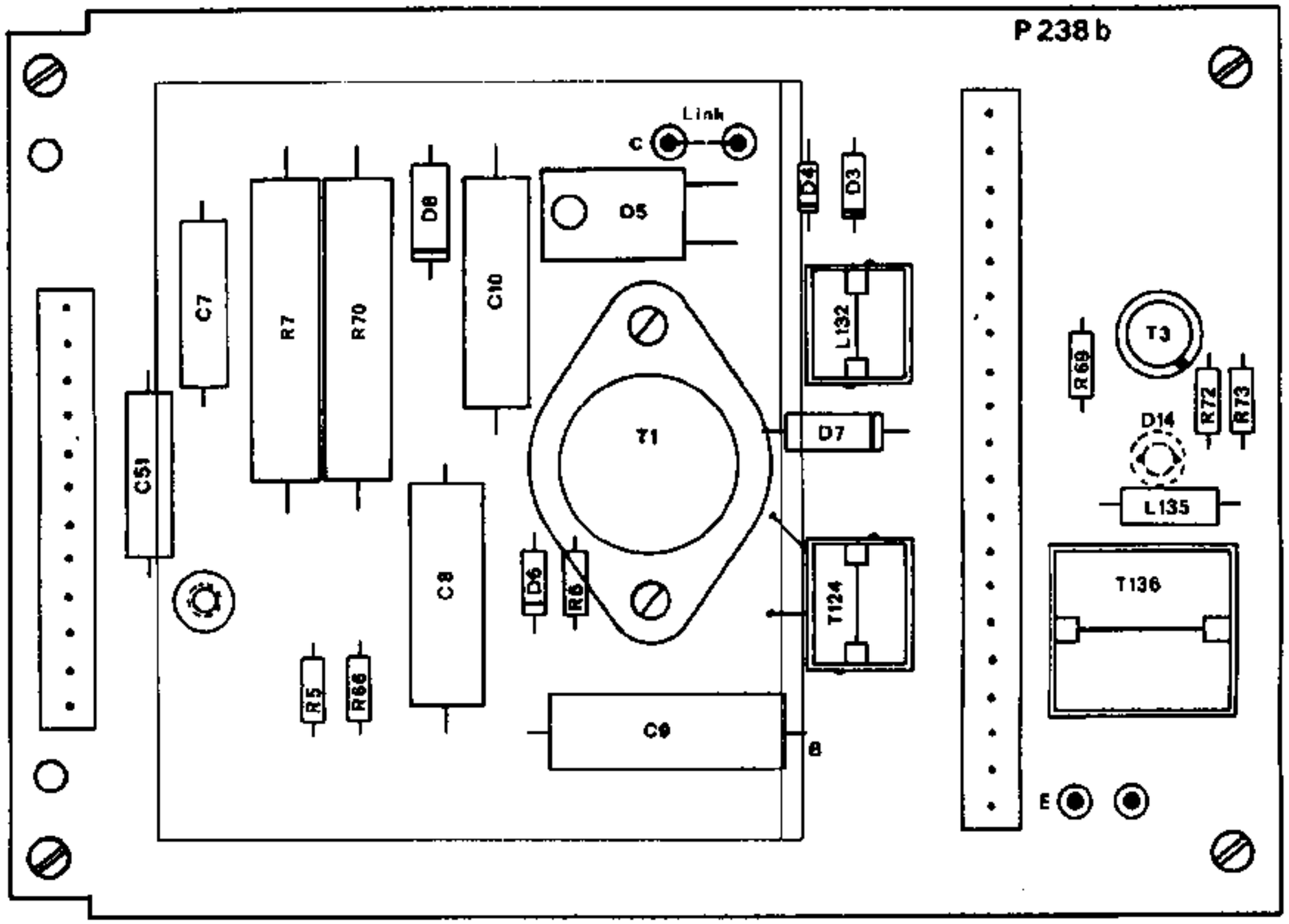
D47

D40

			Title: PC board S 5 - 40
D47,48	1-'86	Ur	Date: 2 - '80
Modifications	Date	App	delta elektronika bv



			Title: PC board S5-40, S15-15, S24-10
P 239 d	11-'85	Vr.	Date: 8-'80
Modifications	Date	App	delta elektronika bv



			Title: PC board
			S5-40, S15-15, S24-10
P238b (D5)	4.'81	U.	Date: 2-'80
Modifications	Date	App	delta elektronika bv

Modifications	Date	App	
			Title: Circuit diagram
			S5-40, S15-15, S24-10
L1, IC3 (P237f)	2-'86	Vr.	Date: 8-'80
Modifications	Date	App	delta elektronika bv