

DELTA ELEKTRONIKA BV



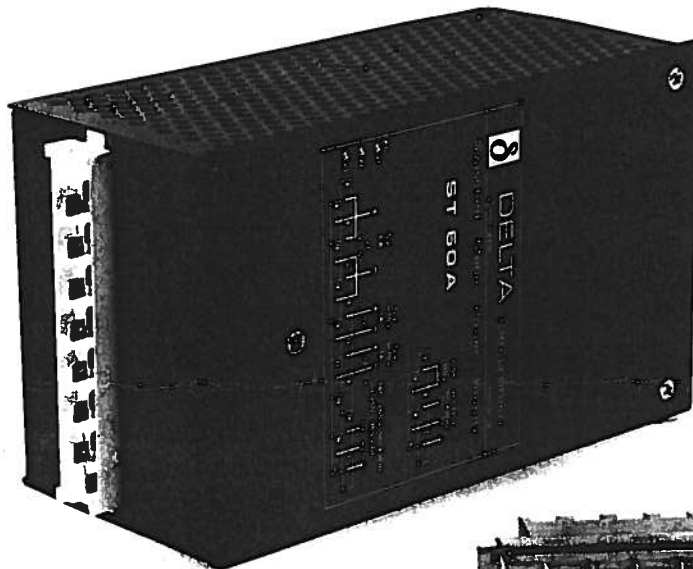
P.O. BOX 27

4300 AA ZIERIKZEE

NETHERLANDS

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TRIPLE OUTPUT POWER SUPPLY ST 60 A

Three isolated outputs, each individually regulated

After Serial No 9286 ST 60 A is changed for use at 12V as well as at 15V

	Voltage	Current	Adj.range	Remarks
Output 1:	5 V	6 A	4.8 - 5.5 V	Max. 10A when outputs 2 and 3 are not loaded
Output 2:	12 or 15 V	1 A	11.8 - 15.5 V	Put range switch at 12V or 15V
Output 3:	12 or 15 V	1 A	11.8 - 15.5 V	Put range switch at 12V or 15V

Output 1 is switched mode regulated. Outputs 2 and 3 are slave outputs with extra linear regulators. This makes their regulation independent from output 1.

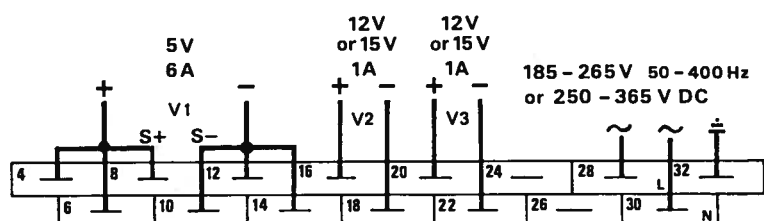
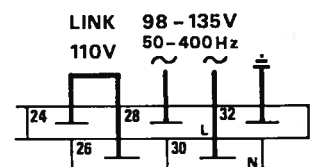
All outputs are floating and can be connected in any desired configuration, in series, parallel or floating. The outputs 2 and 3 can also be used unequal like +15V and -12V.

To keep the dissipation in the linear regulators low the transformer has taps for 12 and 15 V which can be chosen with small switches. The voltage adjustment is with trimpots. If the outputs 2 and 3 are used on 12 V with the switches still in the 15 V position the unit gets hot and might be switched off by the thermal protection.

Input Voltage

AC: 185 - 265 V 50 - 400 Hz
98 - 135 V 50 - 400 Hz (With 110 V link at connector)

DC: 250 - 365 V



H15 connector according to DIN 41612

Voltage regulation

At 10-100% load variation:
V1 20 mV, V2 and V3 125 mV

At 185 - 265 V AC line variation:
V1 15 mV, V2 and V3 5 mV

Ripple + noise (incl. spikes)

30 mV p-p on all outputs

Transient response

At a load change 10 to 100%
Max. deviation 0.5V
Recovery time: V1 1 mS
V2 and V3 less than 0.1 mS
(V1 loaded with minimum 10%)

Temp. coeff. of output voltages

0.02% per °C (at constant load after 15 min.
warm up)

Efficiency

72% at full load and 220V AC input.

Overvoltage protection

Internal SCR crowbar OVP, set to operate at
approximately 7 V on V1.
This also shuts down V2 and V3.

Hold-up time

40 mS at full load and 220V AC input.

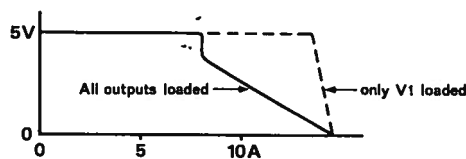
Temperature range

-10 to +50 °C at 100% output current.
Derate current linearly to 20% at 75 °C.
A thermoswitch shuts down the output when the
unit gets overheated.

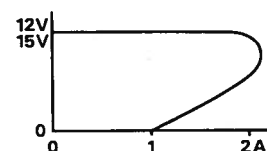
Led lamp

Led lamp on front end indicates output state of V1

Overload protection



Current limit of V1



Current limit of V2 and V3

Series operation

Up to 100 V combined output.

RFI suppression

Conducted interference complies with VDE0875
curve N-12 db on input and curve N on output.

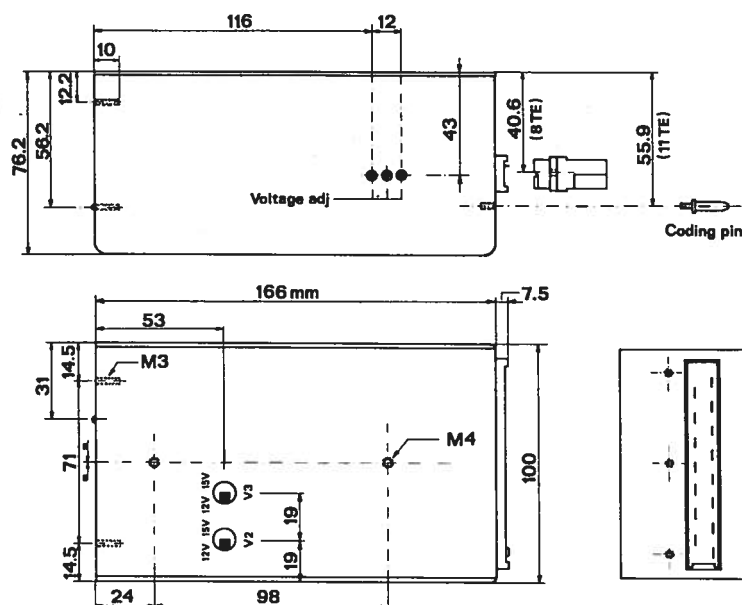
Insulation

2.5 kV AC RMS (1 min.) input to output and
input to case. 500V DC output to case and be-
tween outputs.

Insulation resistance better than 50 MOhm
(measured at 500V DC).

Safety in accordance with IEC 348.

Weight 1.4 kgs



Eurocassette according to DIN 41494.

*A 16 TE front panel, a coding strip
and pin can be ordered separately.*

*An adapter for panel mounting
(model PA1) is also available.*

R = Ohm

1 = 16 25 °C
(Keystone RL 450-10-73-S48)

2 = 150 k

3 = -

4 = 150 k

5 = -

6 = 8,2

7 = 10

8 = 1 k

9 = -

10 = 390

11 = 10 k

12 = 10 k

13 = 10 k

14 = 10 k

15 = 12 k

16 = 33 k

17 = 15 k

18 = 470

19 = 4,7 k

20 = 470

21 = 33 k

22 = 1 k

23 = 18

24 = 18

25 = 10

26 = 560

27 = 100 potm.

28 = 220

29 = 330 NTC

30 = 1,5

31 = 1,5

32 = 1 k 7W WW

33 = 120

34 = 100

35 = 470

36 = 150

37 = 1 k potm. 20 trn

38 = 1 k

39 = 1,5 k

40 = -

41 = -

42 = -

43 = 100

44 = 4,7 k

45 = CR

46 = 1 k potm.

47 = 100 k

48 = 150 k

49 = -

50 = 68

51 = 47

52 = 1 k potm. 20 trn

53 = 1,8 k

54 = 220

55 = 1,8 k

56 = 1 k potm. 20 trn

57 = 220

D

1 = VJ 1048 Varo

2 = BYV 26D Philips

3 = BYV 26D Philips

4 = BYV 26D Philips

5 = ZPY 6,2 ITT

6 = VSK 3030S Varo

7 = VSK 3030S Varo

8 = ZPY 6,2 ITT

9 = BTY 79-200R Philips

10 = G 314 N4 Philips

11 = ZPD 5,6 ITT

12 = ZPD 6,8 ITT

13 = 1 N 4148 TI

14 = 1 N 4148 TI

15 = 1 N 4148 TI

16 = ZPD 6,2 ITT

17 = BYV 26D Philips

18 = BYV 26D Philips

19 = BYV 26D Philips

20 = -

21 = -

22 = TL 431 ILP TI

23 = TL 431 ILP TI

24 = BYV 32/150 Philips

25 = BYV 32/150 Philips

26 = BYV 26D Philips

27 = ZPU 150 ITT

28 = 1 N 4148 TI

29 = 1 N 4004 Philips

30 = 1 N 4004 Philips

SW1 = switch DPDT 6A SLD C en K

SW2 = switch DPDT 6A SLD C en K

SW1 + SW2	2-90	Vr.	
D10 rd = grn	10-89	Vr.	Title: ST60 A
R40,46,52,56 (12V/15V)	3-87	Vr.	
D2,3,4,17,18,19,26	7-86	Vr.	Date: 12-84
Modifications	Date	App.	delta elektronika bv

8

C

1 =	0,22	μF	X 250V
2 =	2200	pF	Y 400V
3 =	0,15	μF	X 250V
4 =	2200	pF	Y 400V
5 =	330	μF	200V
6 =	330	μF	200V
7 =	100	μF	25V
8 =	10	nF	500V
9 =	10	nF	500V
10 =	1000	μF	16V
11 =	0,15	μF	X 250V
12 =	0,15	μF	X 250V
13 =	1000	μF	16V
14 =	0,22	μF	100V
15 =	1000	pF	100V
16 =	2200	pF	100V
17 =	0,047	μF	250V
18 =	2200	pF	100V
19 =	2,2	μF	16V
20 =	1	μF	40V
21 =	1000	pF	100V
22 =	1	μF	40V
23 =	680	pF	1600V
24 =	0,22	μF	100V
25 =	2,2	μF	25V
26 =	2200	pF	160V
27 =	1	μF	40V
28 =	0,22	μF	100V
29 =	0,22	μF	100V
30 =	0,22	μF	100V
31 =	2500	pF	250V
32 =	0,22	μF	100V
33 =	220	μF	25V
34 =	220	μF	25V
35 =	0,22	μF	100V
36 =	0,22	μF	100V
37 =	0,22	μF	100V
38 =	15	pF	500V
39 =	0,22	μF	100V
40 =	1	μF	40V
41 =	0,22	μF	100V
42 =	0,22	μF	100V
43 =	0,22	μF	100V
44 =	220	μF	25V
45 =	15	μF	16V
46 =	0,22	μF	100V
47 =	0,22	μF	100V
48 =	15	μF	16V
49 =	220	μF	25V
50 =	15	μF	16V

Q

1 =	2 N 2222	Sescosem
2 =	2 N 2907	Sescosem
3 =	2 N 2907	Sescosem
4 =	-	
5 =	2 N 2907	Sescosem
6 =	MPSŮ 05	Motorola
7 =	VN 66 AF	Siliconix
8 =	2 N 2222	Sescosem
9 =	BUX 48	Sescosem
10 =	2 N 2907	Sescosem

IC

1 =	HEF 4049	Philips
2 =	TLP 580	ITT
3 =	LM 317	
4 =	LM 317	

L

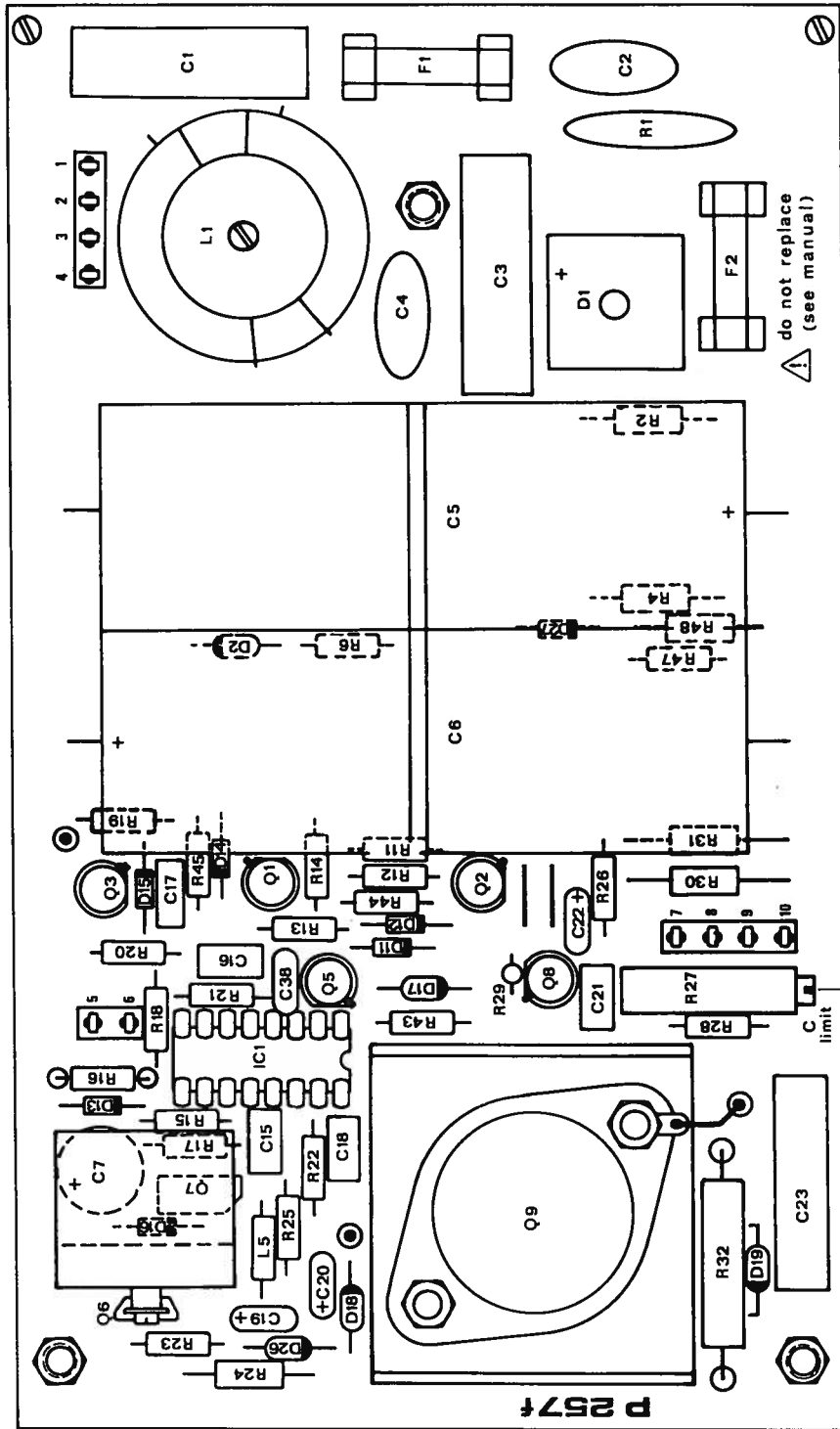
1 =	L 165	Delta
2 =	L 166	Delta
3 =	L 220 A	Delta
4 =	L 221	Delta
5 =	2,2 μH	Secre

T1 = T 222 A Delta

F1 = 2A slow
2 = 800 mA quick

Ts = Thermo switch. Uchiya
UP 62 80 °C 5%

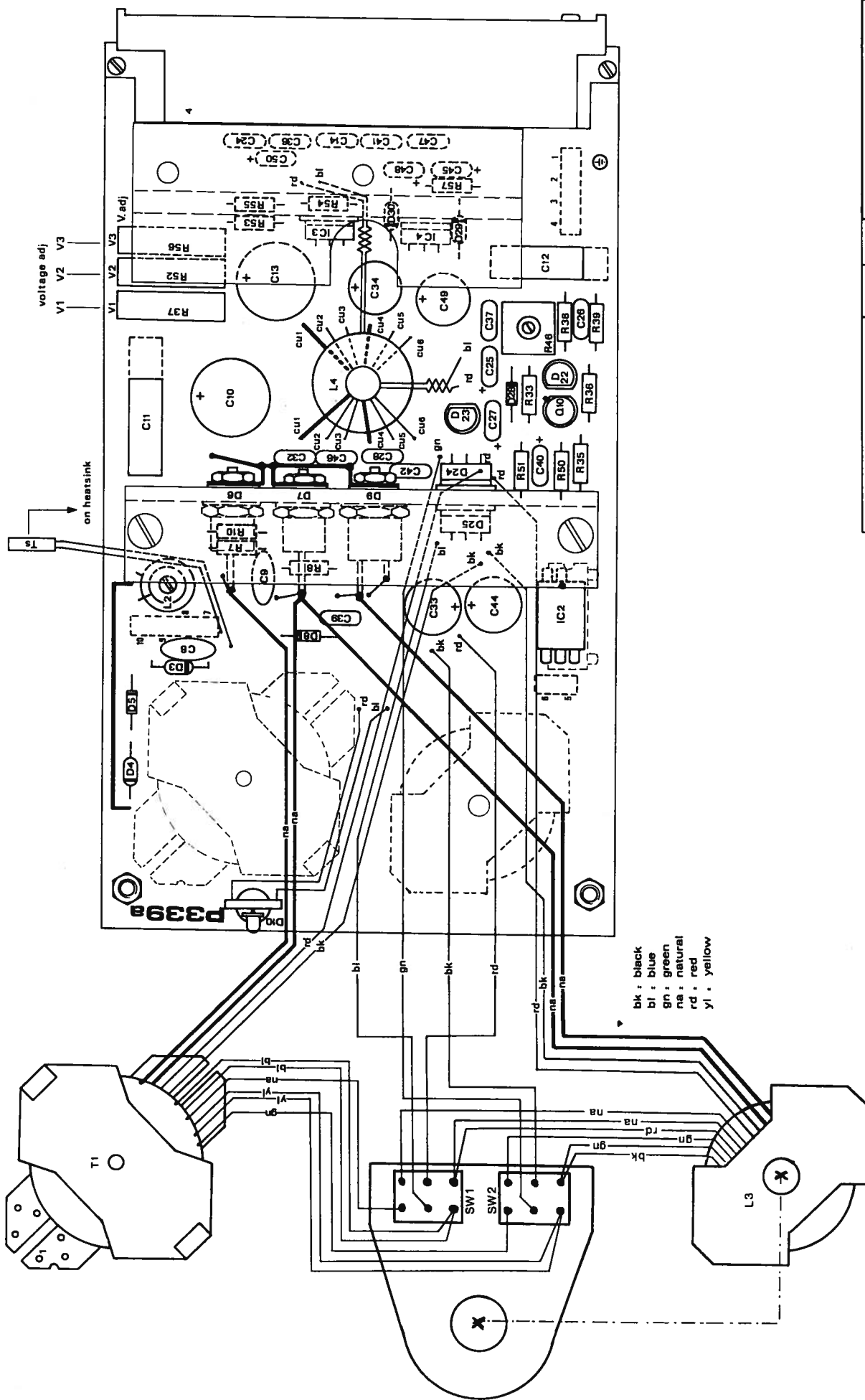
		Title: ST 60 A	
C 2,4,15,16,18,21,26	4-87	U _r .	δ
L 220A, T 222A (12V/15V)	3-87	U _r .	
Modifications	Date	App.	delta elektronika bv



Do not replace F2
 F2 blows when Q9 gets defective
 In that case replacement of F2 can
 also damage other components

Current limit adj.
 factory adjusted
 and sealed
 Warranty lapses
 if seal is broken

P257		Title: ST 60A	
P257e	Dr. 4-87	Date: 12-'84	
(C2, 4, 15, 16, 18, 21)			
Modifications	Date	App	delta elektronika bv



Title: ST60A		Date: 12-84		delta elektronika bv	
Sw1 + Sw2	2-90	U/r.	U/r.	Date	App
12V/15V	3-87	U/r.	U/r.	Date	App
Modifications					

After serial No. 9286 in the ST60A two switches are added to make it possible to use the outputs V2 and V3 at 12V as well as at 15V. These switches are accessible through holes in the bottom plate. It is also possible to use one output at 12V and the other at 15V.

The output voltages can be changed from 12 to 15V by adjusting potmeters with a screw driver and putting the switches of the transformer taps in the corresponding position.

Warning: If the output is at 12V and the tap at 15V the linear regulator will dissipate 3 Watts extra which might activate the thermal protection.

