S 6 – 40
S 15 – 18
S 28 – 10

DELTA ELEKTRONIKA BV

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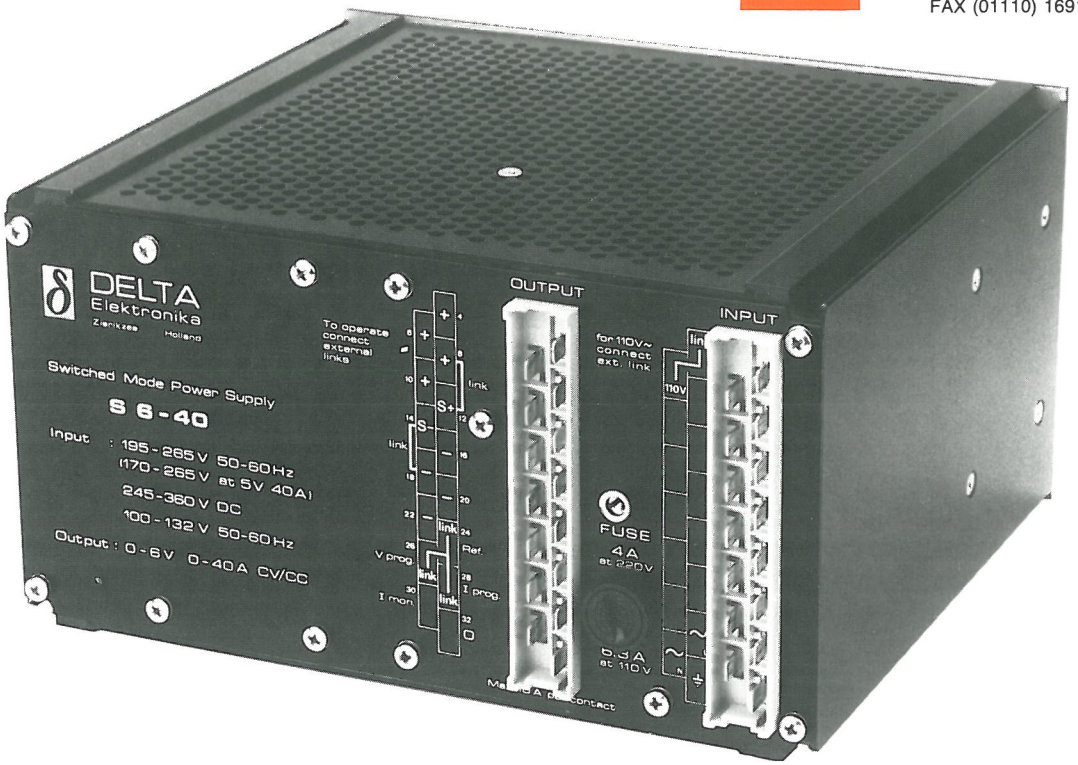


S-SERIES SWITCHED MODE POWER SUPPLIES

Model	CV	CC
S 6-40	**0- 6V**	**0-40A**
S 15-18	**0-15V**	**0-18A**
S 28-10	**0-28V**	**0-10A**

This new S-series replaces the old S-series (S5-40, S15-15, S24-10). However the position of the H15 connectors and the pin connections are different. Improvements are: Higher reliability and efficiency (less heat), more output and current programming + monitoring.

FEATURES

* Very reliable design. Natural convection cooling (no blower).
* Modern 100kHz switcher with efficiency up to 90% at 28V 10A.
* Both constant voltage and constant current variable from zero to full range by internal or external potentiometer.
* Both CV and CC programmable with 0-5V.
* Current monitoring output 0-5V for external current meter and to drive slave power supplies in parallel operation.
* No inrush current during switch on.
* 50Hz choke in series with input to improve input current wave shape.
* Input both AC or DC. This means that these power supplies also can be used as DC-DC converters, for example S28-10 from 215-350VDC to 24V 10ADC.

SPECIFICATIONS

Input voltage	AC:	195-265 V 50-60 Hz	Fuse: 4.0 A slow blow
		100-132 V 50-60 Hz	Fuse: 6.3 A slow blow
	DC:	245-360 V DC	Fuse: 4.0 A slow blow

Insulation	Input - output	3.75 kV RMS (1 min.). This is the test voltage of the separation components like transformers (cannot be tested on the unit).
	Input - case	2.5 kV RMS (1 min.)
	Output - case	500 V DC (continuously)

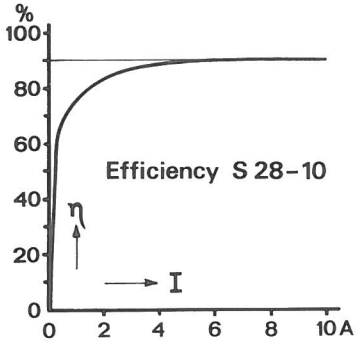
Delay of soft start The output is available approximately 500 mS after switch-on.

Hold-up time 15 mS at 220 V AC input and full load. Longer at reduced output.

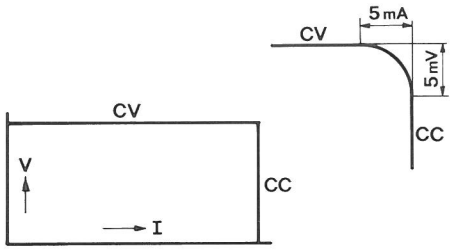
RFI suppression According to VDE 0871-B both on input and output.

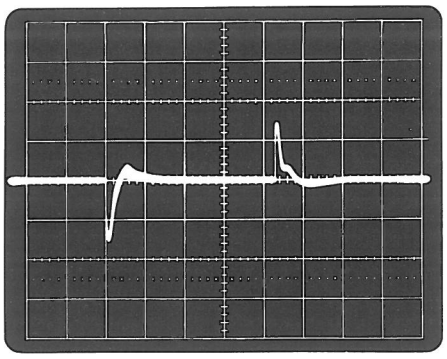
Efficiency	DC input	AC input
S 28-10 at 28 V 10 A	90 %	88 %
S 15-18 15 V 18 A	88 %	86 %
S 6-40 6 V 40 A	81 %	80 %

Input power at no load is about 6 Watts.



Output regulation	CV	CC (S6-40)
Load 0-100 %	5 mV	10 mA (30 mA)
Line 190-265 V	5 mV	10 mA (30 mA)
Ripple + noise, p-p Measured with a short probe directly at output	25 mV	15 mA (50 mA)
Temp. coeff. per °C	5.10^{-5}	1.10^{-4}
Stability during 8 hours after 1 hour warm-up	5.10^{-4}	1.10^{-3}
Programming input	0-5 V	0-5 V
Monitor output	-	0-5 V
Recovery time for recovery to within 100 mV after a load step 10-100 %	0.3 mS	-



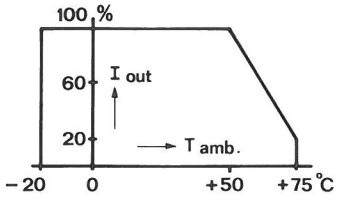


Recovery time S 28-10 at 10-100% load step
Horizontal 0.5 mS/div. Vertical 0.2 V/div.

Output impedance (0-100 kHz), less than 0.1 Ohm

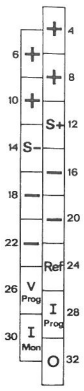
Ambient temperature

-20 to +50 °C at full output. From 50 to 75°C the output current has to be derated linearly to 20 % at 75 °C. At -20 °C ripple increases to 35 mV p-p and the recovery time to 0.5 mS.

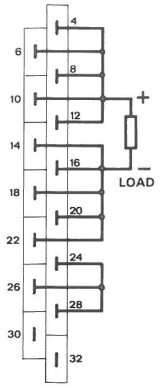


Thermal protection

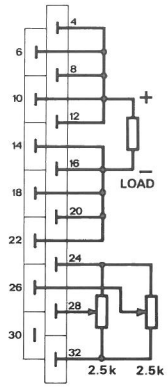
A thermostat shuts down the output in case of insufficient cooling. This can be caused by wrong mounting or by blocking the natural airflow vertically through the unit.



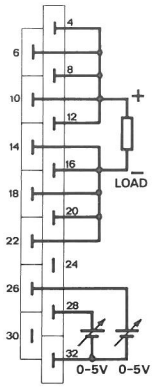
Connections at H15 connector



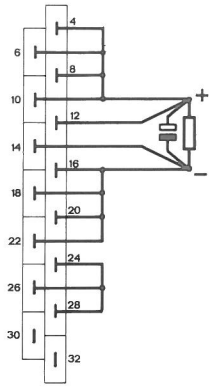
Internal voltage and current adj.



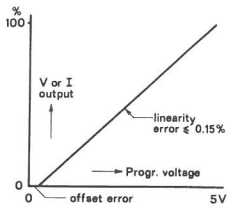
External voltage and current adj.

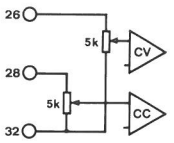


Voltage and current programming by 0-5V



Remote sensing





Internal circuit

Programming by voltage

Both output voltage and current can be programmed by 0-5 V. The input impedance of the programming inputs is the 5 kOhm of the internal voltage and current adjustment potentiometers which have to be turned to max. for programming. The programming input voltage is 0-5 V +/-2% for full range. However it can be changed with the V or I adj. potm., for example to 0-10 V. The linearity error (not incl. offset) is max. 0.15 %. The offset error is max. + 15 mV for voltage- and max. + 25 mV for current programming. The maximum programming speed is 600 V/sec. However the electrolytic output capacitors will overheat at a combined high programming amplitude and repetition frequency.

Remote sensing

Remote sensing at the load point can be used to compensate for the voltage drop across the load leads. Max. 2 V per load lead can be compensated. The OVP has to be set higher accordingly. An extra electrolytic capacitor at the load is recommended. In case of accidental interruption of the sense leads the output will not go to maximum but only rise about 15 % above the set value. Also the OVP can be used for protection.

Series operation

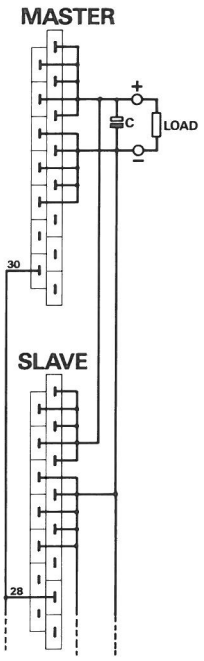
Series operation is allowed up to 500 V total voltage. No provision is made for master and slave series operation. Consult factory if this is required.

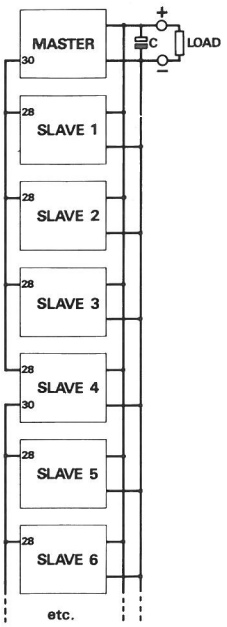
Parallel operation

Units can simply be connected in parallel because the current limit of each unit will avoid overloading. It is recommended to connect the sense points directly to each output and keep the load wires to the summing point of equal length.

Master-slave parallel operation

The current monitor output (0-5V) can be used to drive a slave power supply at its current progr. input. The 2 units will share the current equally. The master-slave combination functions like one power supply which can be adjusted or programmed via the master. One master can drive max. 4 slaves. However a slave can in its turn drive 4 other slaves.



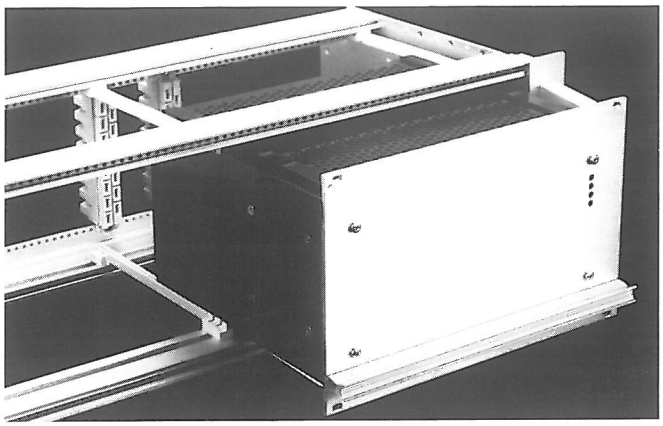


Parallel operation for redundancy

For redundancy the units have to be independent so master/slave operation cannot be used. Diodes are necessary to separate outputs to make detection of an absent output possible. For S 28-10 the redundant adapter RA 10 with series diode and undervoltage alarm contact is available.

Overvoltage protection

An electronic OVP shuts down the output if it exceeds the set value. The adjustment range is 5-35 V. To reset interrupt the AC input.



Dimensions and weight

Eurocassette acc. to DIN 41494, 38 TE, 194.5 x 106 x 166 mm (W x H x D)

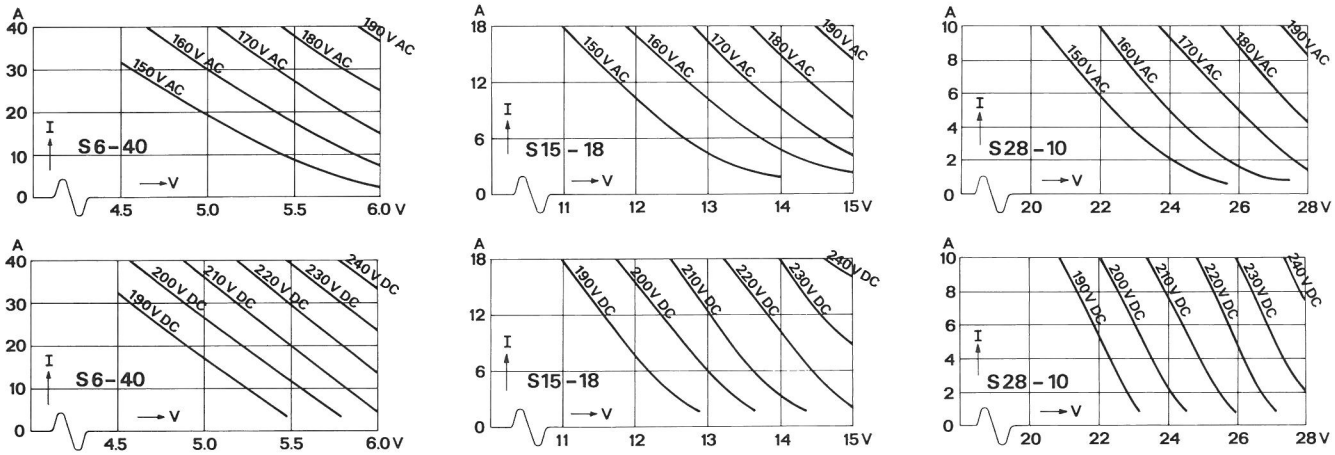
It fits into a 19" Eurocard rack of 3 units height. Weight: 3 kgs

A **40 TE frontpanel** can be ordered separately.

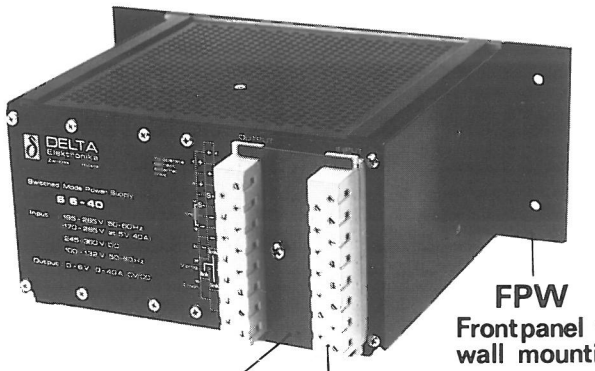
V, I and OVP adjustments are by 20-turn screw adjustment through the frontpanel.

Mounting: Horizontal to allow a vertical natural airflow through the unit.

Use of S-series below the normal AC and DC input range



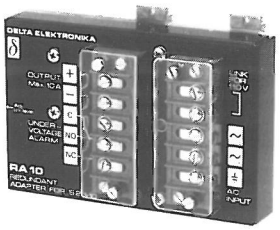
Max. output current as function of output voltage with AC and DC input as parameter.



FPW
Frontpanel for wall mounting

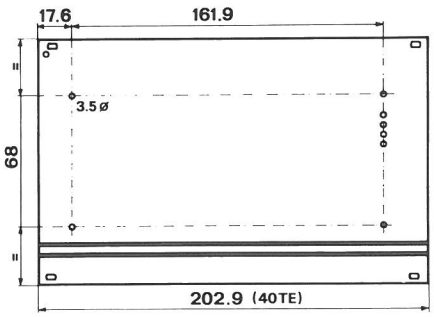
DWG 888

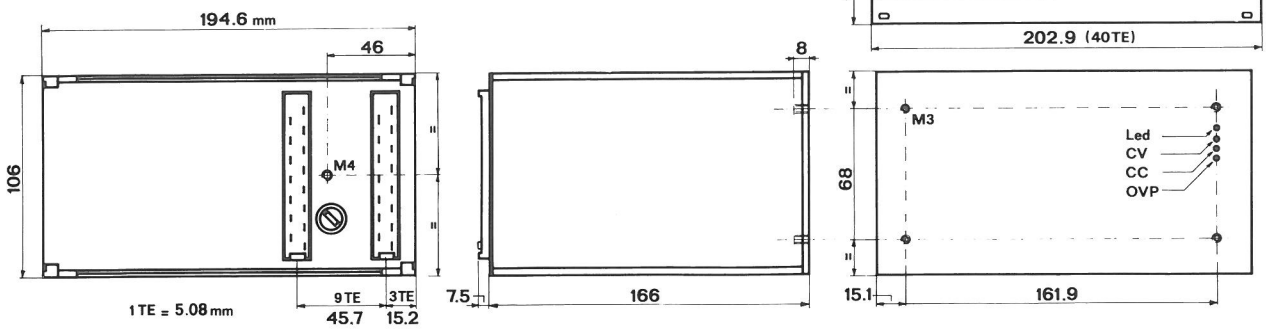
H 15 with screw terminals



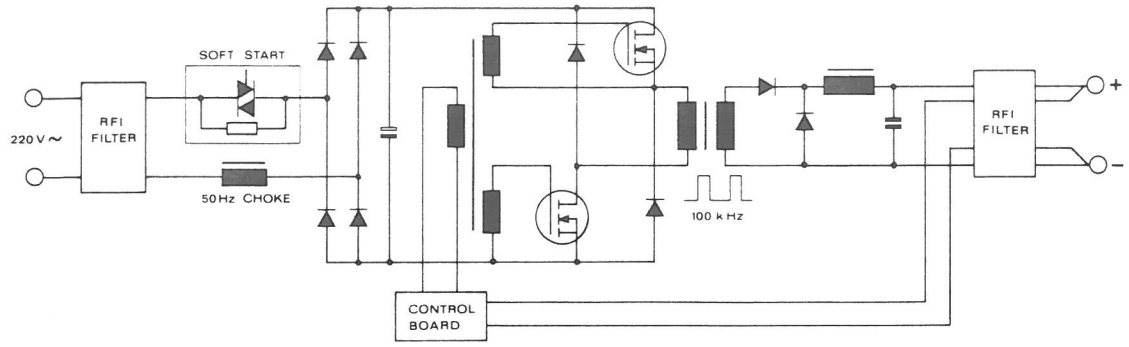
RA 10
Redundant adapter for S 28-10

FP 40
Frontpanel for Eurocard rack mounting





CIRCUIT DESCRIPTION



Simplified functional diagram of the S-series

The 220 VAC line voltage is rectified by a bridge rectifier and smoothed by an electrolytic capacitor. The 50 Hz choke in the input circuit improves the waveshape of the input current so that the low frequency distortion on the line voltage, produced by the rectifying into a large capacitor, is kept to a minimum.

The high frequency interference produced by the switching transistors is prevented from being fed back to the line and the load by carefully designed RFI filters.

When the unit is switched on the electrolytic capacitor is charged via the resistor of the SOFT START circuit, so that no high inrush current will flow. As soon as the voltage is sufficiently high the power supply starts working and the series resistor is bypassed by a triac.

Advantages of the 100 kHz switching frequency are: small size, light weight, low ripple and fast regulation.
The rectified 220 V (300 V DC) is chopped and transformed to a lower voltage. The power converter is of the feed forward type which offers the best efficiency. The regulation is achieved by pulse width modulation.

Careful design, overdimensioning of vital components, several built-in protections and cool operation (possible because of the high efficiency) make the S-series very reliable. They can continuously be used at maximum rating, overloaded and short circuited.

LOAD RIPPLE AND PEAK CURRENTS

Ripple currents caused by the load at frequencies below 1 kHz are compensated by the voltage regulation. However high load ripple currents which exceed the current limit or which have strong components above 1 kHz can overheat the output electrolytic capacitors. Also repetitive high peak currents, as generated by the input current of some 50 Hz DC-AC inverters, can have this effect.
In such cases an external electrolytic capacitor as buffer parallel to the load will solve the problem. Suggested values: 20.000 uF S 6-40, 10.000 uF S 15-18, 4.700 uF S 28-10.

INSTALLATION

POWER REQUIREMENT

AC-input

The S-series operates on any input voltage between 195 and 265 VAC 50 and 60 Hz so it can be used at 220 V as well as on 240 VAC line voltage without any change. Below maximum output voltage the minimum input voltage can even be lower than 195 V. For example at 24 V 10 A the input of the S 28-10 may go as low as 175 VAC.
The input fuse is 4 A slow blow.

For operation on line voltages between 100 and 132 VAC 50 and 60 Hz an external link has to be made at the input connector and the input fuse has to be changed to 6.3 A slow blow.

DC-input

The S-series can also be used as a DC-DC converter with an input voltage between 245 and 360 V. However at lower output voltage the minimum DC input can be lower. For example 215 VDC for S 28-10 at 24 V 10 A.

MECHANICAL

Rack mounting

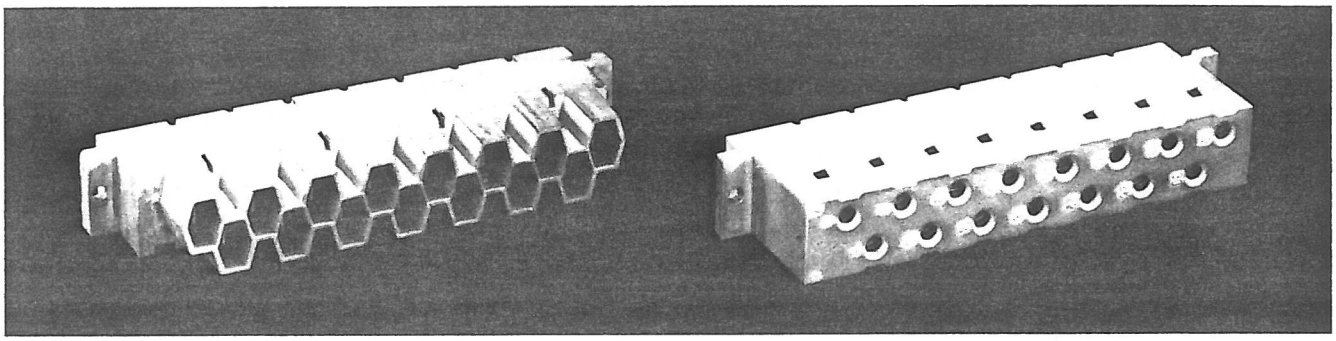
The unit is designed as a Eurocassette according to DIN41494 to fit into a 19" Eurocard rack. The width of the unit is 38 TE. A 40 TE front panel can be ordered separately.

Wall mounting

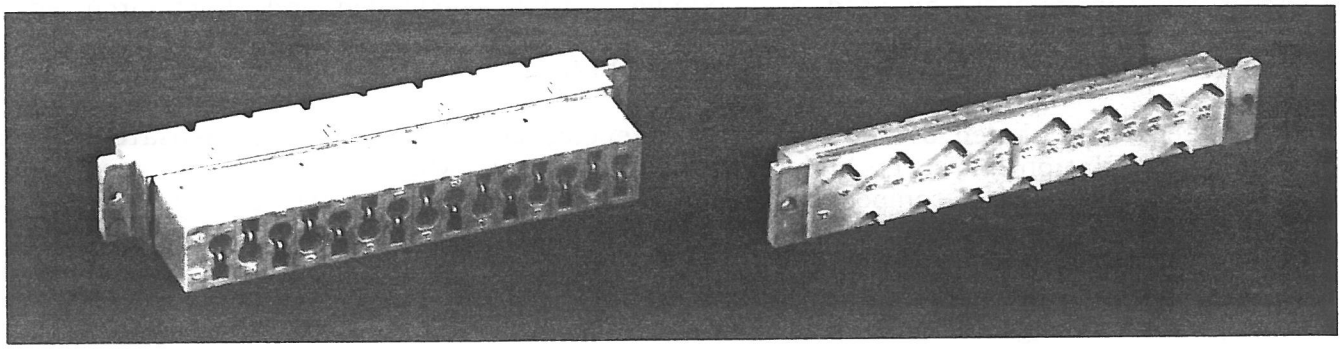
Although the unit is designed as a plug-in Eurocassette it can also be used for wall mounting. A special front panel for wall mounting FPW is available. The connectors can be fixed with a plate type DWG 888

CONNECTORS

With each unit two H15 female connectors with faston tabs 6.3 x 0.8 mm are supplied.



H15 with faston tabs 6.3 x 0.8 mm



with screw terminals

with cage clamps

with solder pins

Also available are H15 female connectors with screw connections, with cage clamps and with solder pins. These can be ordered separately.

At the output connector 4 pins are available for + output and 4 for - output. It is important to use all 4 pins and put them in parallel to keep the voltage loss in the connector to a minimum, especially in the S 6-40.

COOLING

The unit has natural convection cooling (no blower). This means that above and below enough space must be available to permit a vertical airflow through the unit. Although the efficiency is high the dissipated heat at full load is still 38 W for S 28-10 to 60 W for S 6-40 and this has to flow away.

OPERATION

Before operation the following connections have to be made:
The four + connections (pins 4, 6, 8, 10) and the S+ (pin 12) have to be connected together. The same with the four - connections (pins 16, 18, 20, 22) and S- (pin 14). The 5 V reference voltage (pin 24) has to be connected with the voltage regulation (pin 26) and with the current regulation (pin 28).

Internal voltage and current adjustment

The voltage and current can be adjusted with the internal potentiometers which are accessible through the front panel.

External voltage and current adjustment

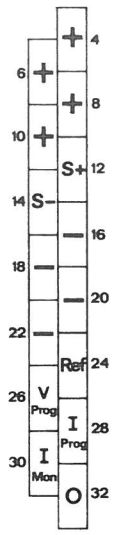
Connect 2.5kOhm potentiometers as drawn. Turn internal potmeters to maximum. Because the 5kOhm of the internal potmeters remains parallel to the external ones the adjustment is not linear.

External voltage and current programming

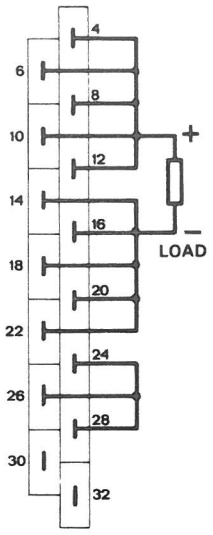
Turn internal potmeters to maximum. A programming voltage of 0-5V gives the full range of output voltage or current. The input impedance of the programming inputs is 5kOhm (the resistance of the internal potentiometers). The nonlinearity of the programming is max. 0.15% of full range. The offset error is max. +15mV (0.3%) for voltage and +25mV (0.5%) for current programming.
The maximum programming speed is 600V per sec., however the product of dv/dt (in V/s) x amplitude (in V) x repetition frequency (in Hz) may not exceed 2.10^4.

Remote sensing

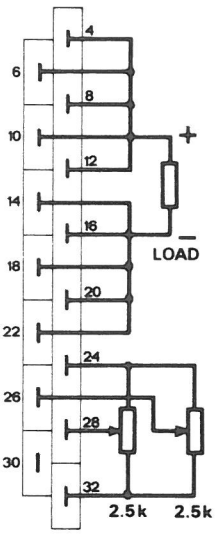
Normally the sense terminals S+ and S- will be connected directly to the + and - at the power supply output. This means that the output voltage is kept constant at the output terminals. However, if the voltage drop across the leads to the load is too high, it is possible to keep the voltage across the load constant by means of remote sensing.
Max. 2V per lead (total 4V) compensation is possible. The total voltage drop across the load leads has to be subtracted from the maximum voltage range. The OVP setting has to be increased accordingly.
In order to prevent undesired oscillations when using external sensing an extra electrolytic capacitor at the load is recommended. 20.000uF for S6-40, 10.000uF for S15-18, 4.700uF for S28-10.



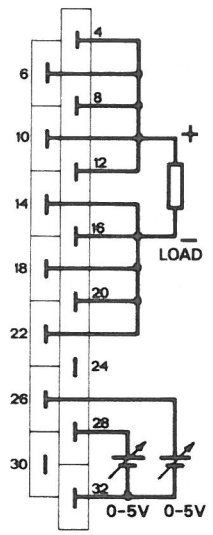
Connections at H15 connector



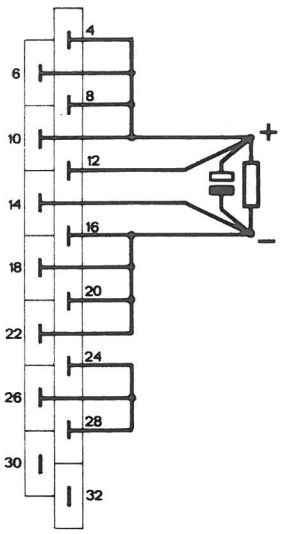
Internal voltage and current adj.



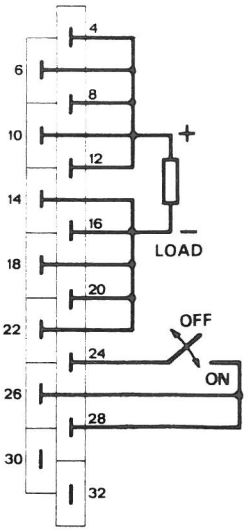
External voltage and current adj.



Voltage and current programming by 0-5V



Remote sensing

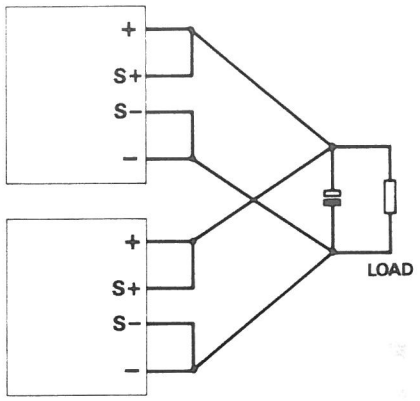


Remote ON/OFF

OVP adjustment

It is recommended to put the overvoltage protection about 2 V above the working voltage. The OVP can be adjusted with a screw driver through a hole in the frontpanel. To adjust the OVP:

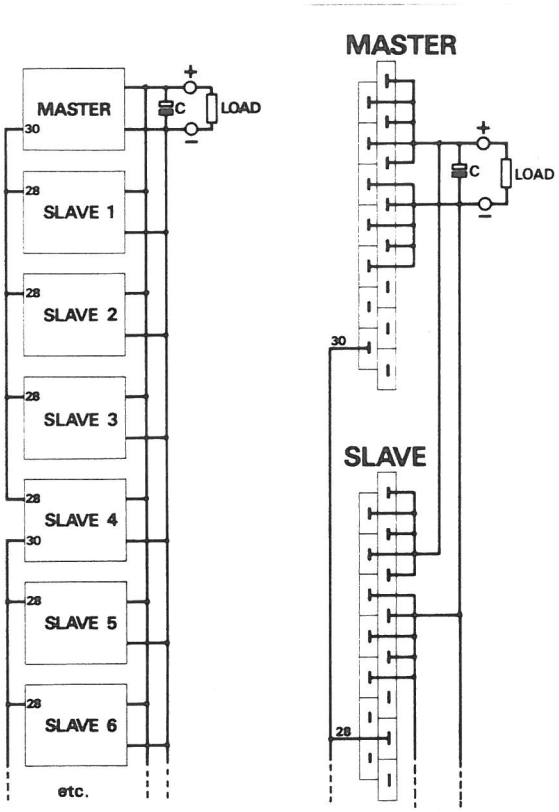
a. Turn the OVP adjustment to maximum.
b. Turn the output voltage to the desired trip level (unloaded of course).
c. Slowly turn the OVP potmeter counterclockwise until the OVP trips.
d. Disconnect the input and before putting it on again turn the voltage adjustment lower.



Parallel operation

Parallel operation

When using two or more power supplies in parallel it is recommended to keep the leads to the summing point of equal length and not to use remote sensing.
An extra electrolytic capacitor at the summing point is recommended. Value 20.000 uF S 6-40, 10.000 uF S 15-18, 4.700 uF S 28-10.
The current will not be shared equally. However the current limit will avoid overloading.
Eventually the current limits of all units can be decreased to enable operation at higher ambient temperature.

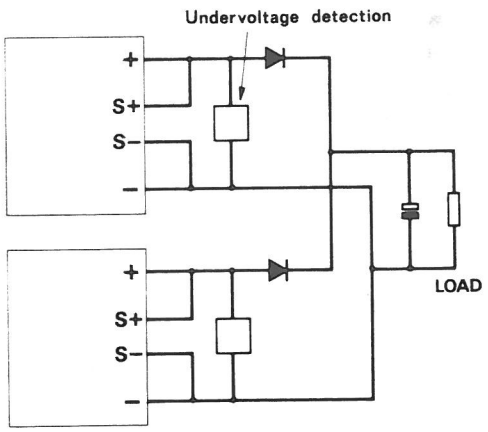


Master-slave parallel operation

In master-slave parallel connection all units will share the current equally.
For master-slave operation connect pin 30 of the output connector of the master to pin 28 of each slave and turn the internal voltage and current potmeters of the slaves to maximum. The slaves will now follow the master when it is adjusted or programmed.
The combination will operate like one big power supply. The master can drive a maximum of 4 slaves. However pin 30 of a slave can again drive 4 other slaves.

Parallel connection for redundancy

If units are connected in parallel for redundancy master-slave operation cannot be used because in that case each unit has to operate independently.
In order to detect whether one of the outputs fails it is necessary to separate the units with diodes.
For S 28-10 a complete redundant adapter RA 10 is available. It has a series diode and an undervoltage detection built-in.
At undervoltage (level adjustable 10-28 V) a reed relay contact changes over and can be used for alarm.



Parallel for redundancy

MAIN SECTION

C100	= 1UF 250V RMS X2	
C101	= 0.22UF 250V RMS X2	
C102	= 4700PF 400V RMS	SAFETY
C103	= 4700PF 400V RMS	SAFETY
C104	= 0.1UF 250V RMS X2	
C105	= 680UF 200V	SPRAGUE
C106	= 680UF 200V	SPRAGUE
C107	= 22UF 200V	
C108	= 22UF 200V	
C109	= 5000PF 250V	CERAMIC
C110	= 0.1UF 250V RMS X2	
C200	= 1000PF 1000V	POLYPROP
C201	= 4700PF 630V	POLYPROP
C202	= 47PF 500V	CERAMIC
C203	= 1UF 400V	
C204	= 1UF 400V	
C205	= 47PF 500V	CERAMIC
C206	= 4700PF 630V	POLYPROP
C207	= 1000PF 1000V	POLYPROP
C208	= 10PF 400V RMS	SAFETY
C311	= 0.22UF 63V	
C312	= 0.22UF 63V	
C313	= 0.22UF 63V	
C314	= 0.22UF 63V	
C315	= 0.1UF 250V RMS X2	
C400	= 2200PF 100V	POLYPROP
C401	= 10NF 500V	CERAMIC
C402	= 100PF 500V	CERAMIC
C403	= 2200PF 100V	POLYPROP
C404	= 22UF 40V	
C405	= 2200PF 100V	POLYPROP
C406	= 100PF 1000V	CERAMIC
C407	= 1000PF 100V	POLYPROP
C408	= 220UF 25V	
C409	= 220UF 25V	
C500	= 15UF 16V	SOLID ALU
C501	= 1000PF 100V	POLYPROP
C502	= 2200PF 100V	POLYPROP
C504	= 0.22UF 63V	
C505	= 1000PF 100V	POLYPROP
C506	= 15UF 16V	SOLID ALU
C507	= 22NF 250V	
C508	= 2200PF 100V	POLYPROP
C509	= 15UF 16V	SOLID ALU
C510	= 15UF 16V	SOLID ALU
C511	= 0.22UF 63V	
C600	= 15UF 16V	SOLID ALU
C700	= 0.22UF 63V	
C701	= 47NF 250 V	
C702	= 15UF 16V	SOLID ALU
C703	= 15UF 16V	SOLID ALU
C704	= 10NF 250V	
C705	= 100PF 500V	CERAMIC
C706	= 0.22UF 63V	
C707	= 100PF 500V	CERAMIC
C708	= 2200PF 100V	POLYPROP
C709	= 1000PF 100V	POLYPROP
C710	= 100PF 500V	CERAMIC
C711	= 2.2UF 25V	SOLID ALU
C713	= 470PF 100V	POLYPROP
C714	= 1000PF 100V	POLYPROP
C715	= 15PF 500V	CERAMIC
C716	= 100PF 500V	CERAMIC
C717	= 22NF 250V	
C718	= 47PF 500V	CERAMIC
C719	= 15UF 16V	SOLID ALU
C720	= 15UF 16V	SOLID ALU
C721	= 470PF 100V	POLYPROP
C722	= 2.2UF 25V	SOLID ALU
C723	= 100PF 500V	CERAMIC
C724	= 47PF 500V	CERAMIC
C725	= 2200PF 100V	POLYPROP
C726	= 2200PF 100V	POLYPROP
C727	= 10NF 250V	
C728	= 10NF 250V	
C729	= 15PF 500V	CERAMIC
C731	= 15UF 16V	SOLID ALU

D100	= BTA08	THOMSON
D101	= SKB25-06	SEMICRON
D200	= TZB15CB	SEMICON
D201	= BYT08PI400	THOMSON
D202	= BYT08PI400	THOMSON
D203	= BYV26B	PHILIPS
D204	= BYV26B	PHILIPS
D205	= BYV26B	PHILIPS
D206	= BYV26B	PHILIPS
D207	= BYT08PI400	THOMSON
D208	= BYT08PI400	THOMSON
D209	= TZB15CB	SEMICON
D400	= SKB2-08L5A	SEMIKRON
D401	= 1N4148	THOMSON
D402	= BYV26B	PHILIPS
D403	= BYV28-200	PHILIPS
D404	= BYV26B	PHILIPS
D405	= BYV26B	PHILIPS
D500	= 1N4148	THOMSON
D501	= ZPD12	ITT
D502	= ZPD10	ITT
D503	= ZPD8.2	ITT
D504	= 1N4148	THOMSON
D505	= 1N4148	THOMSON
D506	= 1N4148	THOMSON
D507	= 1N4148	THOMSON
D508	= 1N4148	THOMSON
D509	= 1N4148	THOMSON
D510	= 1N4148	THOMSON
D511	= 1N4148	THOMSON
D512	= BYV26B	PHILIPS
D600	= ZPD15	ITT

D601	= 1N5818	MOTOROLA
D602	= ZPY20	ITT
D603	= 1N4148	THOMSON
D604	= 1N4148	THOMSON
D700	= 1N4148	THOMSON
D701	= Z0104BA	TAG
D702	= 1N4148	THOMSON
D703	= 1N4148	THOMSON
D704	= 1N4148	THOMSON
D705	= ZPD8.2	ITT
D706	= 1N4148	THOMSON
D707	= ZPD8.2	ITT
D708	= ZPD12	ITT
D709	= ZPD12	ITT
D710	= ZPD8.2	ITT
D711	= 1N4148	THOMSON
D712	= 1N4148	THOMSON
D713	= 1N4148	THOMSON
D714	= 1N4148	THOMSON
D715	= ZPY12	ITT
D716	= ZPY12	ITT
D717	= CQY54 LED RED	PHILIPS
F100A	= FUSE 5X20 4T	220V
F100B	= FUSE 5X20 6.3T	110V
F200	= FUSE 5X20 2.5FF	
F300	= FUSE PICO .25F	
F400	= FUSE PICO .25F	
F401	= FUSE 5X20 1T	
IC400	= UC3842	UNITRODE
IC500	= HEF4069UBD	PHILIPS
IC501	= HEF4069UBD	PHILIPS
IC502	= TL431ILP	TEXAS
IC700	= TL084IN	TEXAS
IC701	= TL431ILP	TEXAS
IC702	= OP05CP	BOURNS
IC703	= REF02HP	BOURNS
L100	= 2X3.9MH 6A	RFI FILTER
L101	= L241	DELTA
L102	= L240	DELTA
L103	= L247	DELTA
L200	= L236	DELTA
L201	= L232	DELTA
L203	= L232	DELTA
L600	= L237	DELTA
L700	= 15UH	SIEMENS
L701	= L245	DELTA
Q200	= IRF740	IR
Q201	= IRF740	IR
Q400	= MTP2N85	MOTOROLA
Q500	= 2N2222A	THOMSON
Q501	= BS170	ITT
Q502	= 2N2907A	THOMSON
Q503	= 2N2222A	THOMSON
Q504	= 2N2222A	THOMSON
Q505	= 2N2907A	THOMSON
Q506	= BS250	ITT
Q507	= 2N2907A	THOMSON
Q508	= 2N2222A	THOMSON
Q600	= BS250	ITT
Q601	= BS170	ITT
Q602	= BST100	PHILIPS
Q603	= IRF513	IR
R100	= 47	WW/7.0W
R101	= 392	MF/0.6W/250V
R102	= 10	MF/1.6W/500V
R105	= 150K	MF/0.6W/250V
R106	= 150K	MF/0.6W/250V
R200	= 10	MF/0.6W/250V
R201	= 332	MF/0.6W/250V
R202	= 332	MF/0.6W/250V
R203	= 10	MF/0.6W/250V
R401	= 68.1K	MF/0.6W/250V
R402	= 15K	MF/0.6W/250V
R403	= 392K	MF/0.6W/250V
R404	= 681K	MF/0.6W/250V
R405	= CR	MF/0.6W/250V
R406	= 8.25K	MF/0.6W/250V
R407	= 39.2K	MF/0.6W/250V
R408	= 39.2K	MF/0.6W/250V
R409	= 39.2K	MF/0.6W/250V
R410	= 39.2K	MF/0.6W/250V
R411	= 6.81	MF/0.6W/250V
R412	= 475	MF/0.6W/250V
R413	= 221	MF/0.6W/250V
R414	= 10K	MF/0.6W/250V
R415	= 5.62	MF/0.6W/250V
R416	= 2.2K	MF/1.6W/500V
R417	= 2.2K	MF/1.6W/500V
R500	= 332	MF/0.6W/250V
R501	= 332	MF/0.6W/250V
R502	= 10K	MF/0.6W/250V
R503	= 10K	MF/0.6W/250V
R504	= 10K	MF/0.6W/250V
R505	= 10K	MF/0.6W/250V
R506	= 10K	MF/0.6W/250V
R507	= 475	MF/0.6W/250V
R509	= 4.75K	MF/0.6W/250V
R510	= 4.75K	MF/0.6W/250V
R511	= CR	MF/0.6W/250V
R513	= CR	MF/0.6W/250V
R514	= CR	MF/0.6W/250V
R515	= 6.81K	MF/0.6W/250V
R516	= 1K	MF/0.6W/250V
R517	= 1K	MF/0.6W/250V
R518	= 3.32K	MF/0.6W/250V
R519	= 3.32K	MF/0.6W/250V
R521	= 4.75K	MF/0.6W/250V

R522	= 10	MF/0.6W/250V
R523	= 26.7	MF/0.6W/250V
R524	= 26.7	MF/0.6W/250V
R525	= 1K	MF/0.6W/250V
R526	= 22.1	MF/0.6W/250V
R527	= CR	MF/0.6W/250V
R528	= 1K	MF/0.6W/250V
R529	= 10K	MF/0.6W/250V
R530	= 18.2	MF/0.6W/250V
R600	= 10K	MF/0.6W/250V
R601	= 4.75K	MF/0.6W/250V
R700	= 47.5	MF/0.6W/250V
R701	= 22.1	MF/0.6W/250V
R702	= 681	MF/0.6W/250V
R703	= 150	MF/0.6W/250V
R704	= 681	MF/0.6W/250V
R705	= 6.81K	MF/0.6W/250V
R706	= 475	MF/0.6W/250V
R707	= 5K TRIMPOTM 20 TURNS	
R708	= 150	MF/0.6W/250V
R709	= 332	MF/0.6W/250V
R710	= 2.21M	MF/0.25W/1600V
R711	= 4.75K	MF/0.6W/250V
R712	= 4.75K	MF/0.6W/250V
R713	= 2.21K	MF/0.6W/250V
R714	= 10K TRIMPOTM 20 TURNS	
R715	= 82.5K	MF/0.6W/250V
R716	= 4.75K	MF/0.6W/250V
R717	= 4.75K	MF/0.6W/250V
R718	= 1K	MF/0.6W/250V
R723	= 5K TRIMPOTM 20 TURNS	
R725	= 100K	MF/0.6W/250V
R726	= 825	MF/0.6W/250V
R727	= 4.75K	MF/0.6W/250V
R728	= 4.75K	MF/0.6W/250V
R731	= 2.21M	MF/0.25W/1600V
R732	= 10K TRIMPOTM 20 TURNS	
R733	= 100K	MF/0.6W/250V
R734	= 100K	MF/0.6W/250V
R735	= 1K	MF/0.6W/250V
R736	= 825	MF/0.6W/250V
R737	= 825	MF/0.6W/250V
R738	= 10	MF/0.6W/250V
R739	= 10	MF/0.6W/250V
R740	= 5K TRIMPOTM 20 TURNS	
R741	= 26.7K	MF/0.6W/250V
R742	= 22.1	MF/0.6W/250V
R743	= 10	MF/0.6W/250V
R744	= 332	MF/0.6W/250V
R745	= 1K	MF/0.6W/250V
R746	= 332	MF/0.6W/250V

SW700	= THERM SWITCH 90 DEGR	
T200	= T242	DELTA
T400	= T239	DELTA
T600	= T235	DELTA

OUTPUT SECTION S6-40

C300	= 10NF 500V	CERAMIC
C302	= 3300UF 12V	SPRAGUE
C303	= 3300UF 12V	SPRAGUE
C304	= 0.1UF 250V RMS	X2
C306	= 15UF 16V	SOLID ALU
C307	= 15UF 16V	SOLID ALU
C308	= 0.22UF 250V RMS	X2
C309	= 3300UF 12V	SPRAGUE
C310	= 0.22UF 250V RMS	X2
C316	= 1UF 63V	
C317	= 0.33UF 50V	MULT LAYR
C318	= 10NF 500V	CERAMIC
C319	= 10NF 630V	
D300	= BYV23-45	PHILIPS
D301	= BYV23-45	PHILIPS
L301	= L250	DELTA
L302	= L244	DELTA
R300	= 3.3	MF/2.5W/500V
R301	= 180	MF/1.6W/500V
R302	= 180	MF/1.6W/500V
R303	= 475	MF/0.6W/250V
R304	= 68.1	MF/0.6W/250V
R305	= 1.0	MF/0.6W/250V
R306	= 2.74K	MF/0.6W/250V
R307	= SHUNT 50MV	DELTA
R308	= 475	MF/0.6W/250V
R309	= 68.1	MF/0.6W/250V
R310	= 1.0	MF/0.6W/250V
R311	= 2.74K	MF/0.6W/250V
R312	= 1.0	MF/0.6W/250V
R313	= 100	MF/0.6W/250V
R314	= 100	MF/0.6W/250V
T201	= T249	DELTA

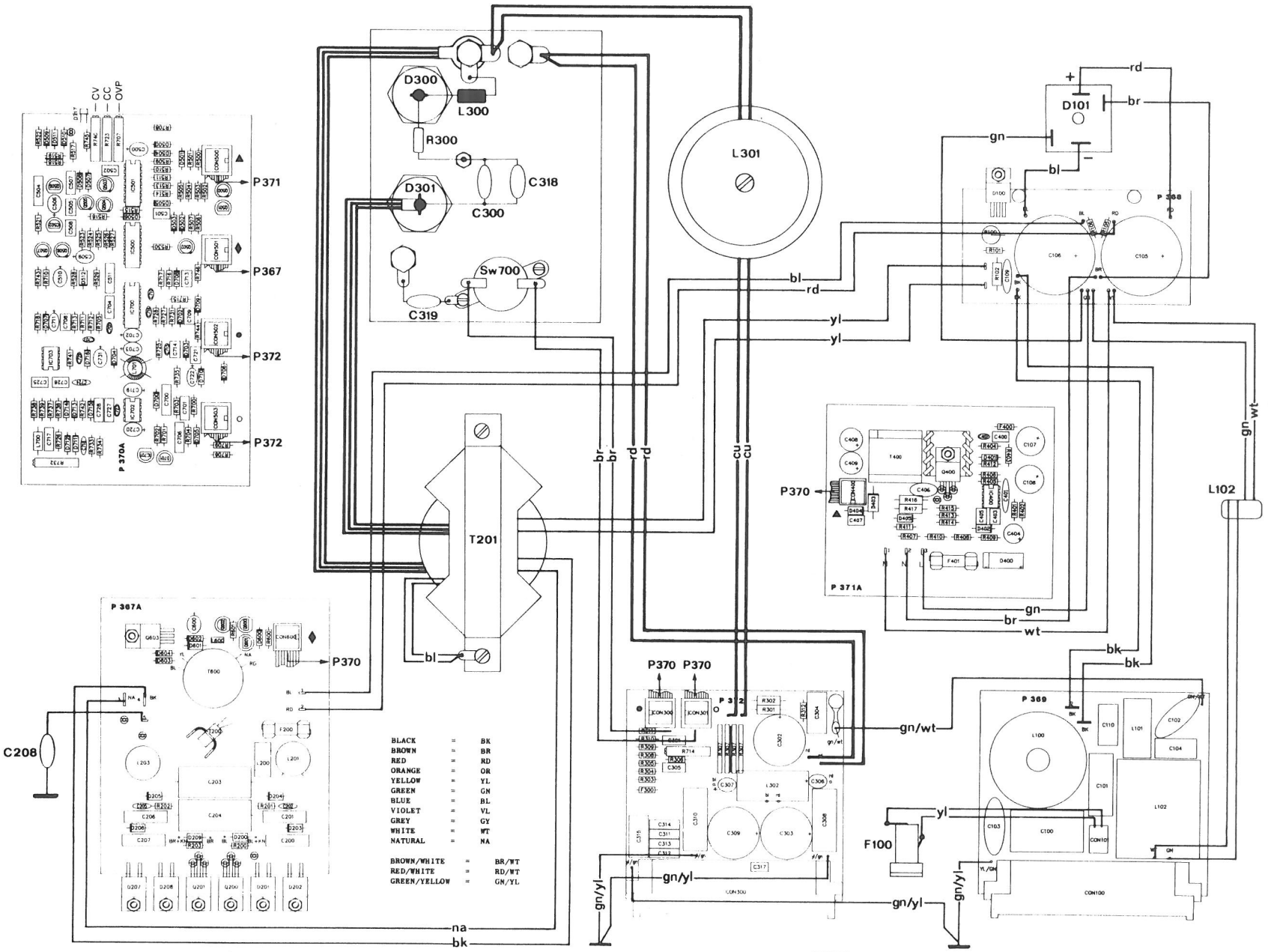
OUTPUT SECTION S15-18

C300	= 1500PF 3000V	CERAMIC
C301	= 47NF 250 V	
C302	= 1800UF 25V	SPRAGUE
C303	= 1800UF 25V	SPRAGUE
C304	= 0.1UF 250V RMS	X2
C305	= 47NF 250 V	
C306	= 15UF 16V	SOLID ALU
C307	= 15UF 16V	SOLID ALU
C308	= 0.22UF 250V RMS	X2
C309	= 1800UF 25V	SPRAGUE

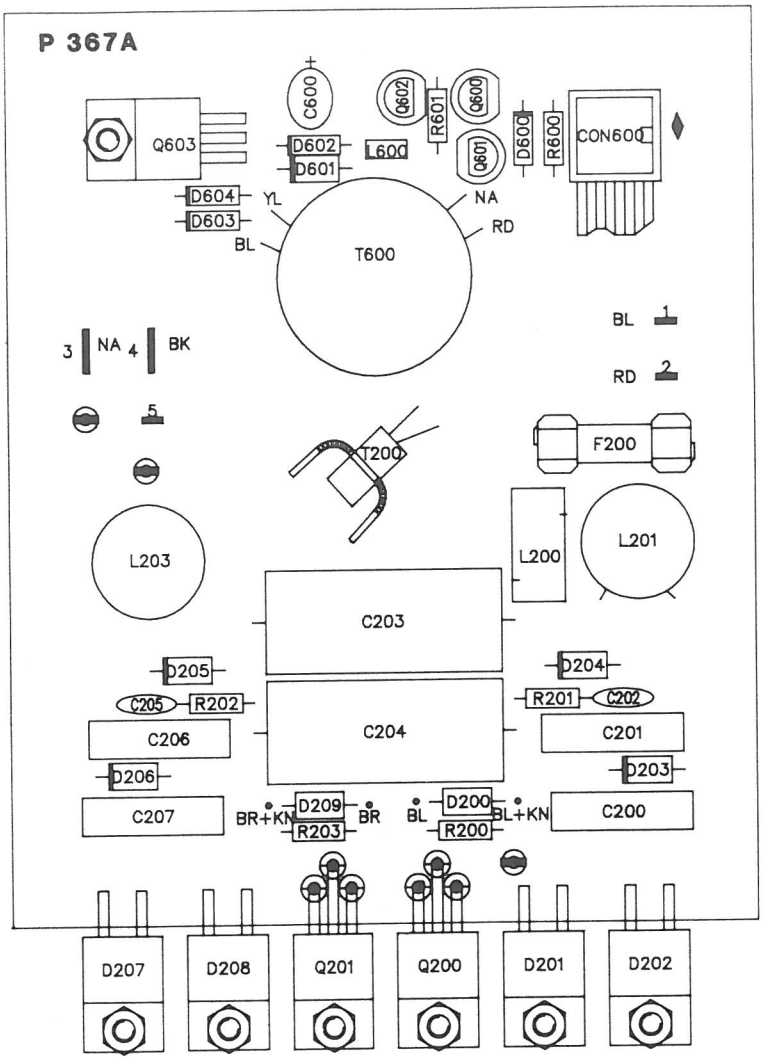
C310	= 0.22UF 250V RMS	X2
C317	= 0.33UF 50V	MULT LAYR
C319	= 10NF 630V	
D300	= BYW93-200U	PHILIPS
D301	= BYW93-200U	PHILIPS
L300	= L246	DELTA
L301	= L251	DELTA
L302	= L252	DELTA
R300	= 18	MF/2.5W/500V
R301	= 1.2K	MF/1.6W/500V
R302	= 1.2K	MF/1.6W/500V
R303	= 2.74K	MF/0.6W/250V
R304	= 2.74K	MF/0.6W/250V
R305	= 1.0	MF/0.6W/250V
R306	= 2.74K	MF/0.6W/250V
R307	= SHUNT 50MV	DELTA
R308	= 2.74K	MF/0.6W/250V
R309	= 2.74K	MF/0.6W/250V
R310	= 1.0	MF/0.6W/250V
R311	= 2.74K	MF/0.6W/250V
R312	= 1.0	MF/0.6W/250V
R313	= 562	MF/0.6W/250V
R314	= 100	MF/0.6W/250V
T201	= T248	DELTA

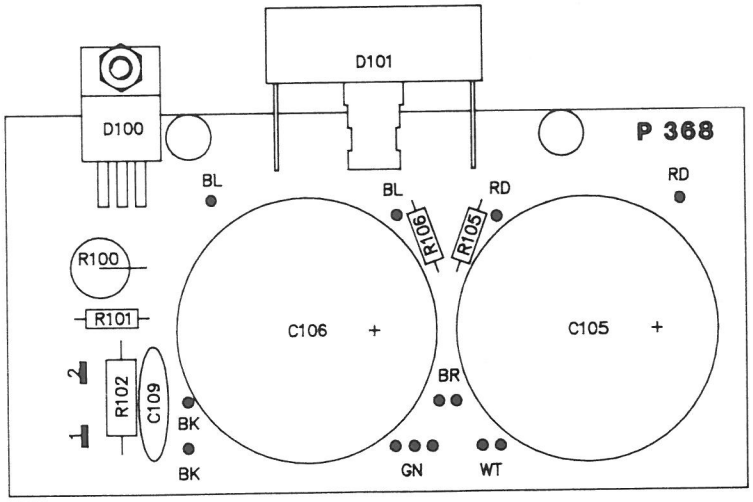
OUTPUT SECTION S28-10

C300	= 1000PF 1000V	CERAMIC
C301	= 10NF 250V	
C302	= 820UF 50V	SPRAGUE
C303	= 820UF 50V	SPRAGUE
C304	= 0.1UF 250V RMS	X2
C305	= 10NF 250V	
C306	= 15UF 16V	SOLID ALU
C307	= 15UF 16V	SOLID ALU
C308	= 0.22UF 250V RMS	X2
C310	= 0.22UF 250V RMS	X2
C317	= 0.33UF 50V	MULT LAYR
C319	= 10NF 630V	
D300	= BYW77-200	THOMSON
D301	= BYW77-200	THOMSON
L300	= L246	DELTA
L301	= L243	DELTA
L302	= L252	DELTA
R300	= 27	MF/2.5W/500V
R301	= 3.9K	MF/1.6W/500V
R302	= 3.9K	MF/1.6W/500V
R303	= 5.62K	MF/0.6W/250V
R304	= 6.81K	MF/0.6W/250V
R305	= 182	MF/0.6W/250V
R306	= 2.74K	MF/0.6W/250V
R307	= SHUNT 50MV	DELTA
R308	= 5.62K	MF/0.6W/250V
R309	= 6.81K	MF/0.6W/250V
R310	= 182	MF/0.6W/250V
R311	= 2.74K	MF/0.6W/250V
R312	= 1.0	MF/0.6W/250V
R313	= 1.82K	MF/0.6W/250V
R314	= 100	MF/0.6W/250V
T201	= T234	DELTA

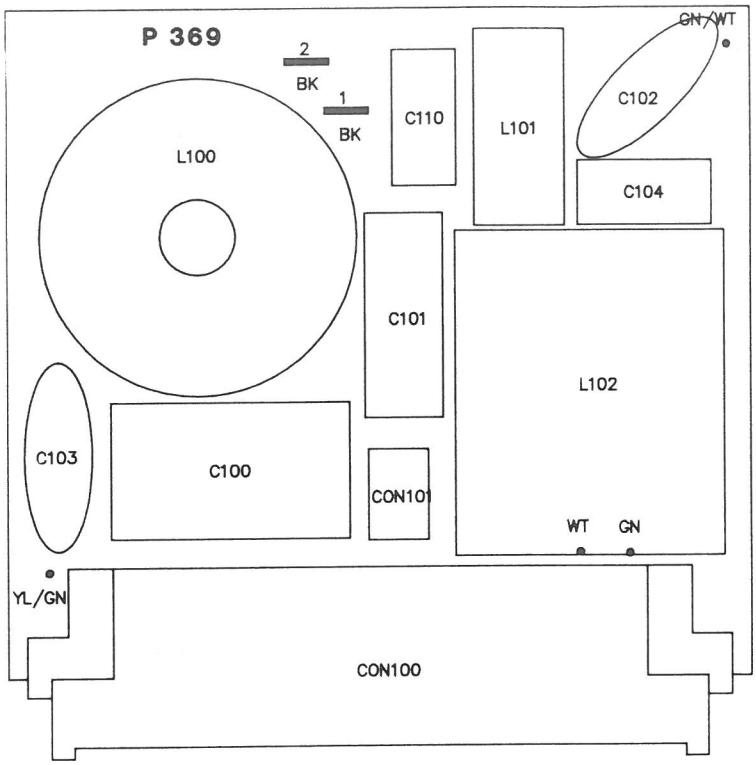


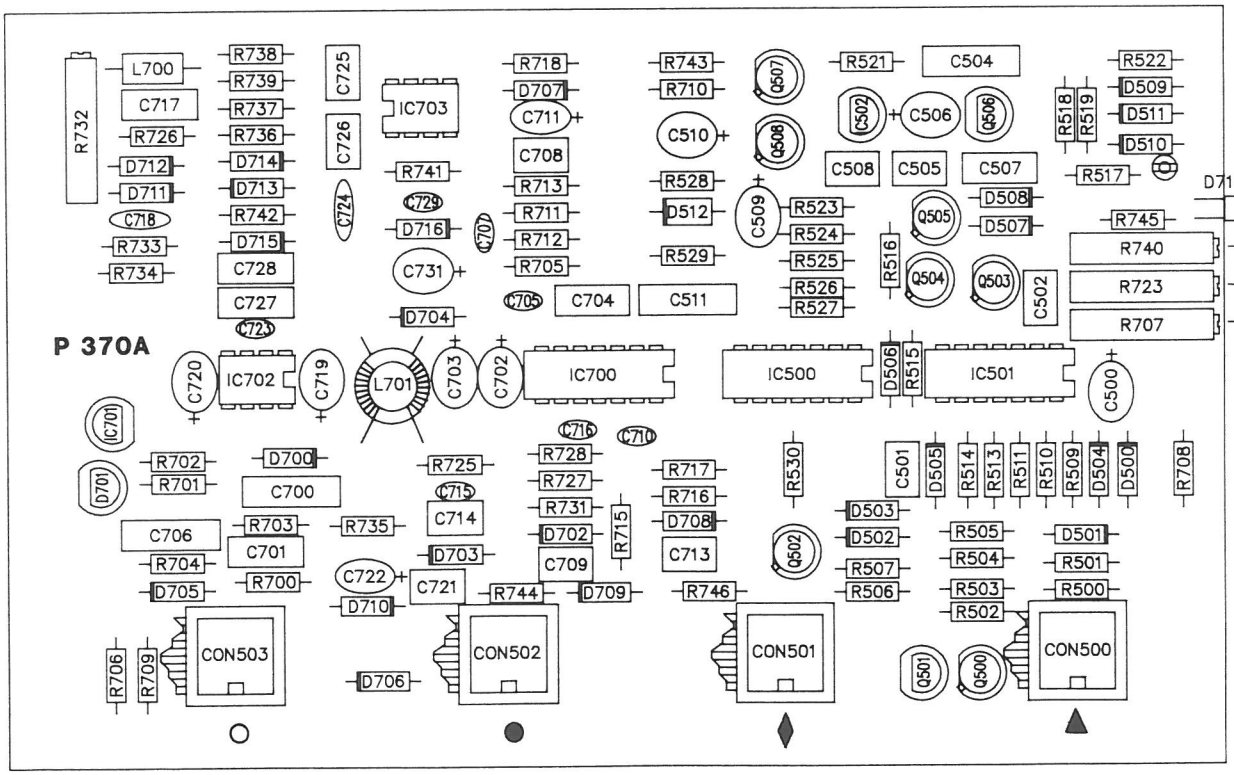
			Title: S6-40, S15-18, S28-10
L300, C318	8-'87	VP	Date: 5-'87
Modifications	Date	App	delta elektronika bv



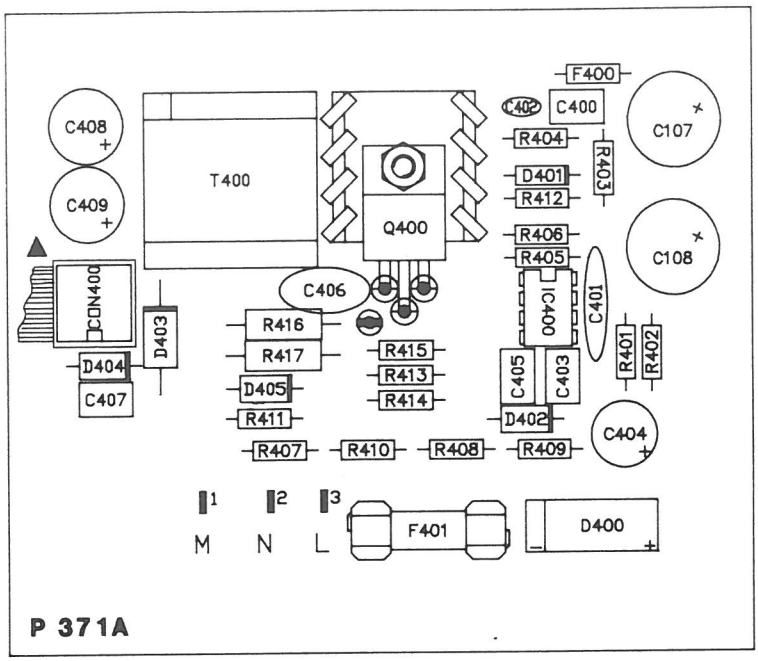


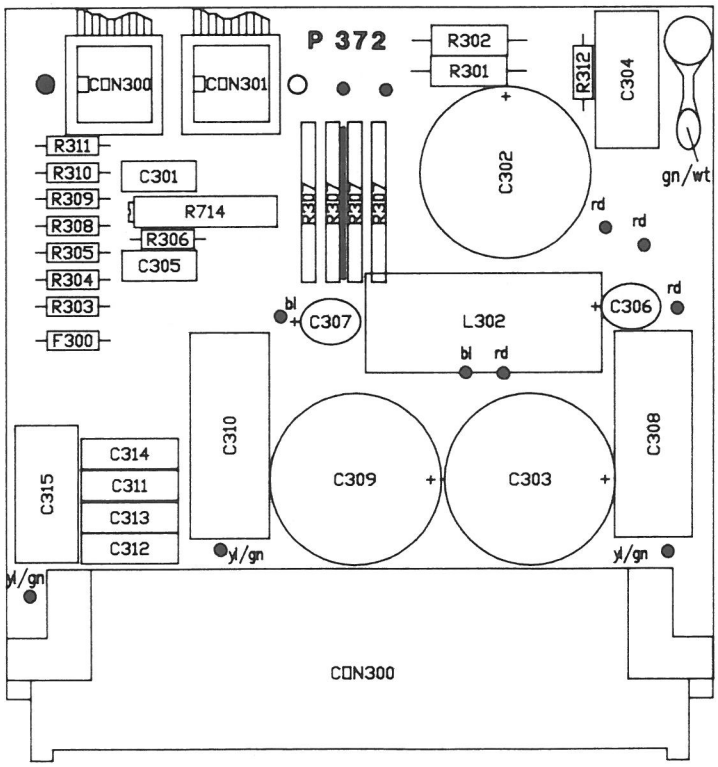
			Title: PC boards S6-40, S15-18, S28-10
P367A type	8-'87	Vr.	Date: 5-'87
Modifications	Date	App.	delta elektronika bv



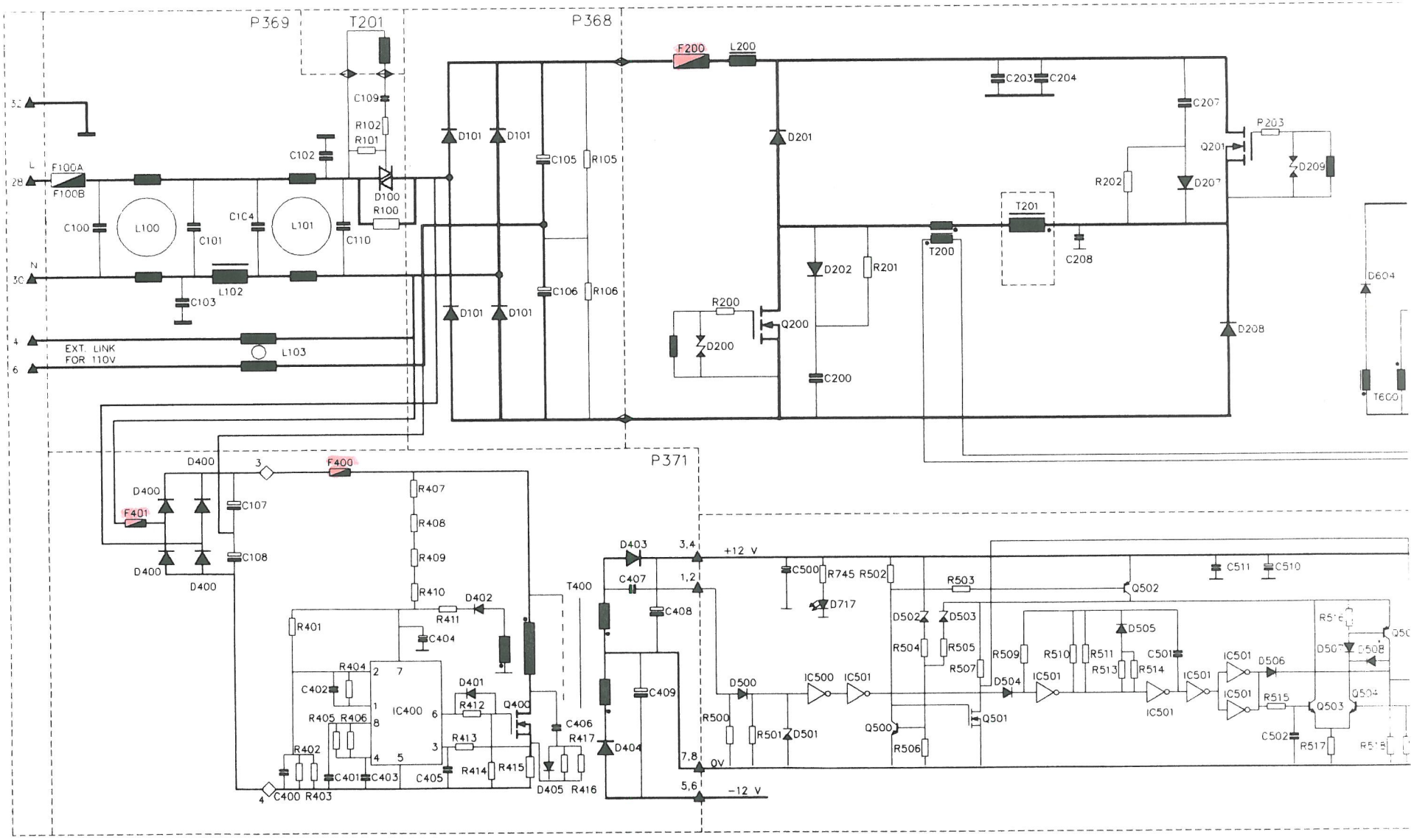


			Title: PC boards S6-40, S15-18, S28-10
P370A type	8-'87	Vr.	Date: 5-'87
Modifications	Date	App.	delta elektronika bv

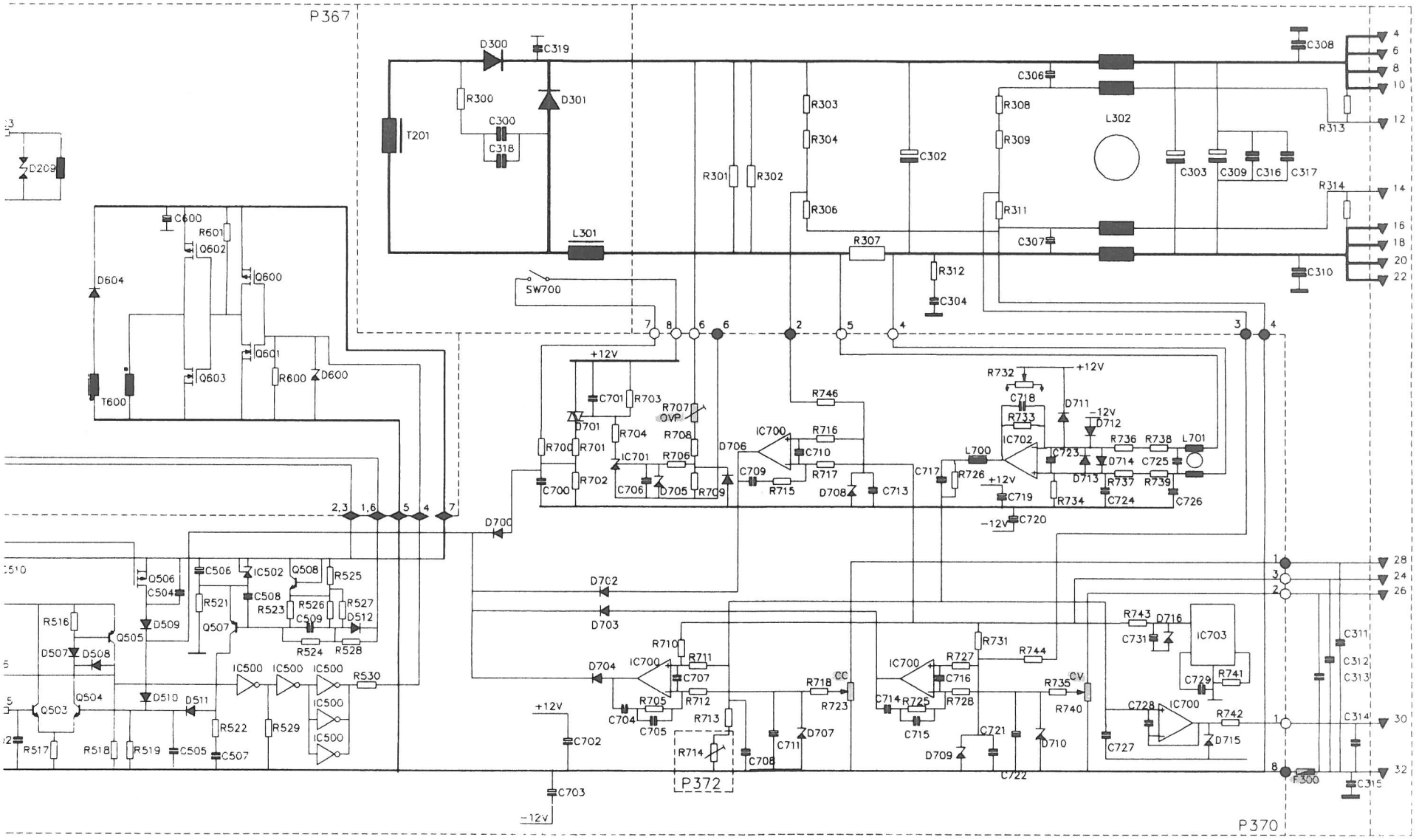




			Title: PC boards S6-40, S15-18, S28-10
P371A type	8-'87	Vr.	Date: 5-'87
Modifications	Date	App.	delta elektronika bv

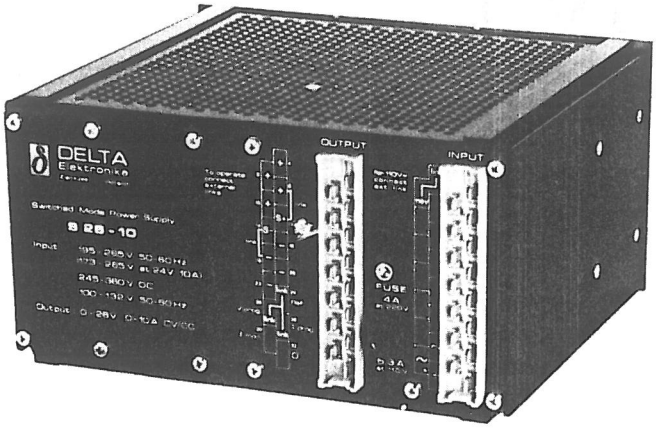


			Title:
			S6-40, S15-18, S28-10
			Date: 5-'87
Modifications	Date	App	delta elektronika bv

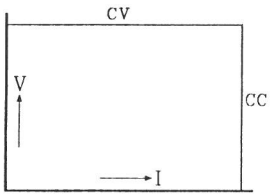


			Title: S6-40, S15-18, S28-10
			Date: 5-'87
Modifications	Date	App	delta elektronika bv

S - SERIES EURO - CASSETTE SWITCHED MODE POWER SUPPLIES



S 6 - 40	**0 - 6 V**	**0 - 40 A**
S 15 - 18	**0 - 15 V**	**0 - 18 A**
S 28 - 10	**0 - 28 V**	**0 - 10 A**



- Voltage and current adjustable by screwdriver at front panel (for fixed voltage and current)
- Accurate Analog Programming of voltage and current by 0 - 5V
- **IEEE 488** programming with external interface PSC 44 M
- 100 kHz power conversion technique
- Low inrush current (soft start)
- Natural convection cooling, no blower, no noise
- Master / Slave parallel operation with equal current sharing
- Parallel and series operation up to 500 V
- Built-in Over Voltage Protection
- Designed for long life at full power

Output	**S 6 - 40**	**S 15 - 18**	**S 28 - 10**
voltage / current	**0 - 6 V / 0 - 40 A**	**0 - 15 V / 0 - 18 A**	**0 - 28 V / 0 - 10 A**
Input			
AC input, full load	100 - 132 V 50 - 60 Hz 195 - 265 V 50 - 60 Hz	100 - 132 V 50 - 60 Hz 195 - 265 V 50 - 60 Hz	100 - 132 V 50 - 60 Hz 195 - 265 V 50 - 60 Hz
DC input, full load	245 - 360 V	245 - 360 V	245 - 360 V
current (220 V AC / 110 V AC) fuse 220V / 110 V	2.2 / 4.0 A rms 4 AT / 6.3 AT	2.3 / 4.2 A rms 4 AT / 6.3 AT	2.3 / 4.2 A rms 4 AT / 6.3 AT
Efficiency			
DC input, full load AC input, 220V, full load	81 % 80 %	88 % 86 %	90 % 88 %
Regulation			
Load 0 - 100% **CV** Line 198 - 265 V AC **CV**	5 mV 5 mV	5 mV 5 mV	5 mV 5 mV
Load 0 - 100% **CC** Line 198 - 265 V AC **CC**	30 mA 30 mA	10 mA 10 mA	10 mA 10 mA
Ripple + noise, rms / p-p **CV** **CC**	5 / 25 mV 15 / 50 mA	5 / 25 mV 5 / 15 mA	5 / 25 mV 5 / 15 mA
Programming speed 0 → Vmax	10 ms	12 ms	15 ms
Output impedance 0-100 kHz **CV**	0.1 Ohm	0.1 Ohm	0.1 Ohm
Temp. coeff., per °C **CV** **CC**	5.10^{-5} 1.10^{-4}		
Stability during 8 hrs after **CV** 1hr warmup **CC**	5.10^{-4} 1.10^{-3}		

Analog Programming	CV	CC
Programming inputs		
input range	0 - 5 V	0 - 5 V
accuracy	± 0.2% - 5 mV / + 12 mV	± 0.5% - 4 mV / + 20 mV
input impedance	5 kOhm	5 kOhm
Monitoring output		
output range	not available	0 - 5 V
accuracy		± 0.5% – 6 mV / + 0 mV
output impedance		20 Ohm
Note: Lower offset programming inputs and monitoring outputs on request		

Recovery time
50 - 100% load step : 100 µs (S6-40, S28-10)
200 µs (S15-18)

Insulation
Input/Output : 3750 Vrms (1 min.)
8mm creepage/clearance
Input/case : 2500 Vrms (1 min.)
Output/case : 500 V DC

Safety : IEC 950 / IEC 348

EMC
RFI-suppression : VDE 0871 B
Immunity : IEC 801-4 level 4
IEC 801-3 level 3

Operating ambient temp. : –20 to +50 °C

Thermal protection : Output shuts down in case of insufficient cooling

Series operation : Max. 600 V total voltage

Remote sensing : Max. 2 V per lead

OVP trip range : 5 - 35 V

Mounting : Vertical airflow through the unit should not be obstructed.

Cooling : Natural convection cooling, no blower, no noise.

Standby input power : 4 W

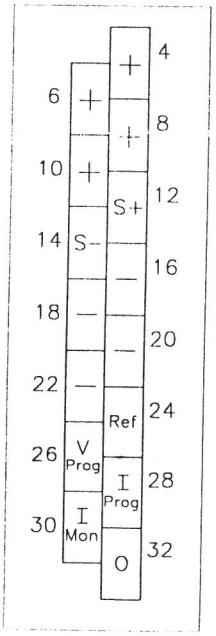
Hold-up time
100 % load, 220 VAC : 20 ms
50 % load, 220 VAC : 40 ms

Dimensions : 194.5 x 106 x 166 mm

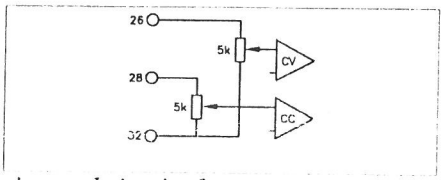
Case
style : DIN 41494
degree of protection : IP20

Connectors : H15 (DIN 41612)

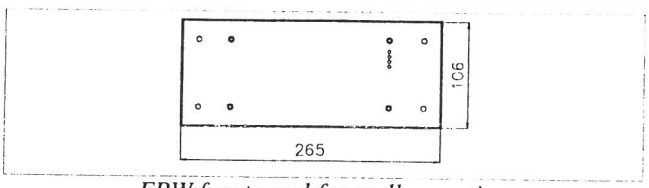
Weight : 2.8 kgs



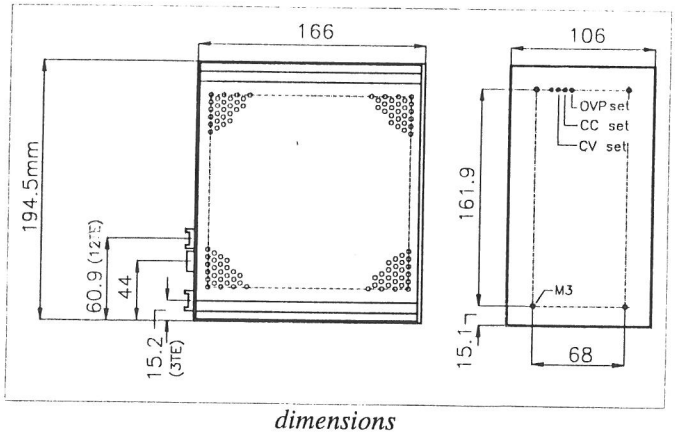
output connector



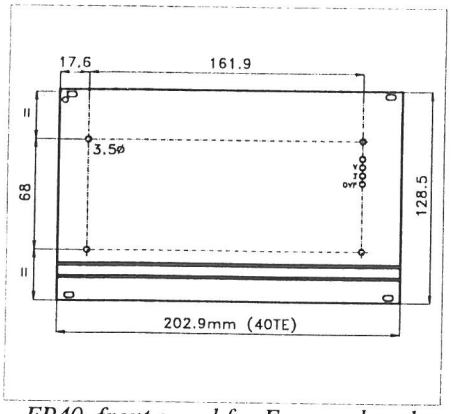
internal circuit of programming inputs



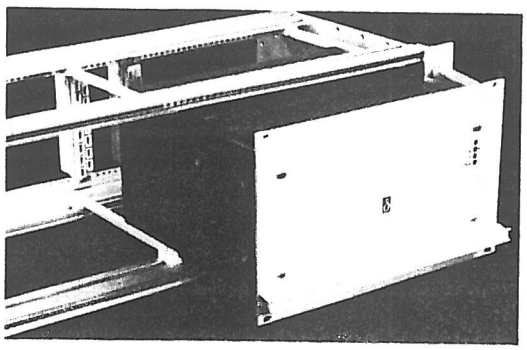
FPW frontpanel for wall mounting

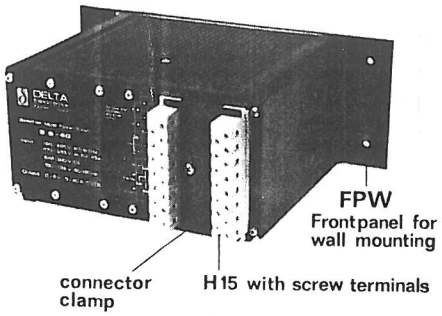


dimensions

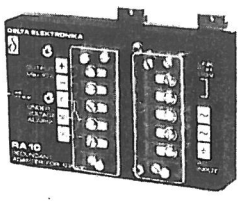


FP40, front-panel for Eurocard-rack


Eurorack mounting with front panel FP40



Wall mounting with front panel FPW



Redundant adapter RA 10 for S28 - 10