

REGULATED POWER SUPPLIES

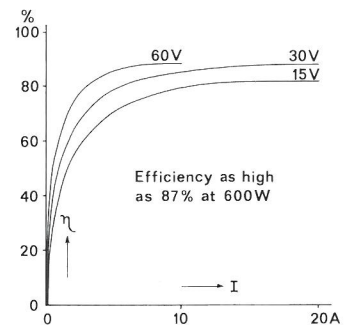
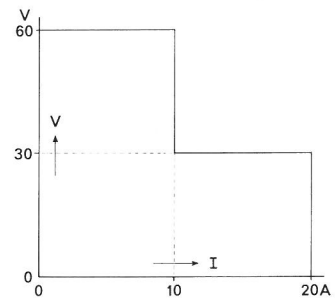


SM 6020

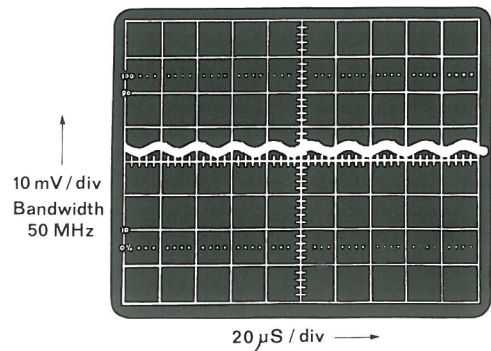
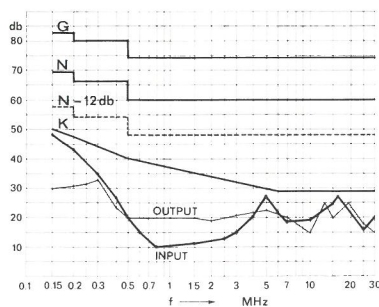
SWITCHED MODE LABORATORY POWER SUPPLY

- * 600 Watts DC output
in 2 ranges, front panel switch selectable

0 - 30 V	0 - 20 A	CV/CC
0 - 60 V	0 - 10 A	CV/CC
- * New 40 kHz switching technique
- * Weight only 9 kgs
- * Input 95-132 V AC / 185-265 V AC, 50-60 Hz
220-350 V DC
- * Insulation 2.5 kV RMS
- * Soft start + choke input
- * Protected against all overload and short circuit conditions
- * Natural convection cooling, no blower
- * Built-in over voltage protector, range 6-65 V
- * V and I programmable by voltage (0-6 V)



- * RFI below level K of VDE 0875 on both input and output.



Output ripple + noise below 10 mV p-p

	CV	CC
<u>Line regulation:</u>		
Input 185-265 V	5 mV	70 mA
<u>Load regulation:</u>		
Load 0-100%	5 mV	70 mA
<u>Ripple:</u> p-p	10 mV	50 mA
<u>Temp. coeff. per °C:</u>	$5 \cdot 10^{-5}$	$5 \cdot 10^{-4}$

Stability:

During 8 hours after 30 min. warm up, under constant load and ambient conditions

	$1 \cdot 10^{-4}$	$1 \cdot 10^{-3}$
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Recovery time:

For recovery to within 0.1 V after a load step from 10 to 100%, measured at 30V 20A

	0.5 mS	-
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Ambient temperature:

-20°C to +50°C at full load
At -20°C recovery time is 1 mS and CV ripple 30 mV p-p

Parallel and series operation:

Up to 500 V combined output

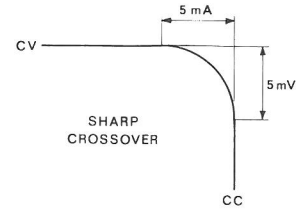
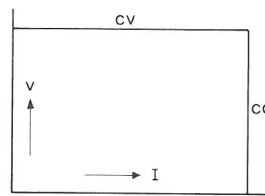
RFI suppression:

According to grade K of VDE 0875, both on input and output

Voltage and current controls:

By two 10-turn potentiometers

CV/CC regulation:



The SM 6020 can be used as a constant voltage source or as a constant current source. The change of mode occurs sharply at the crossing of the voltage and current settings

Remote sensing:

Separate amplifier terminals (S+ and S- on the rear panel) enable the output voltage to be regulated at a remote load point. Voltage drop maximum 2 V per lead

Input voltage:

185-265 V, 50-60 Hz or 220-350 V DC.
After changing an internal link also 95-132 V 50-60 Hz

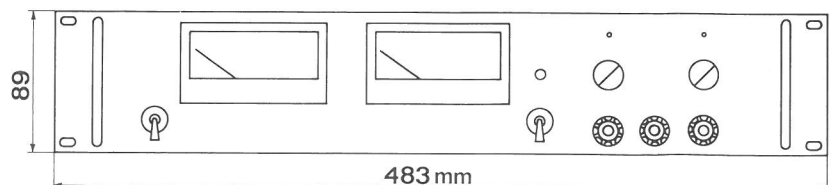
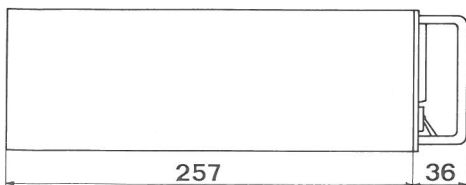
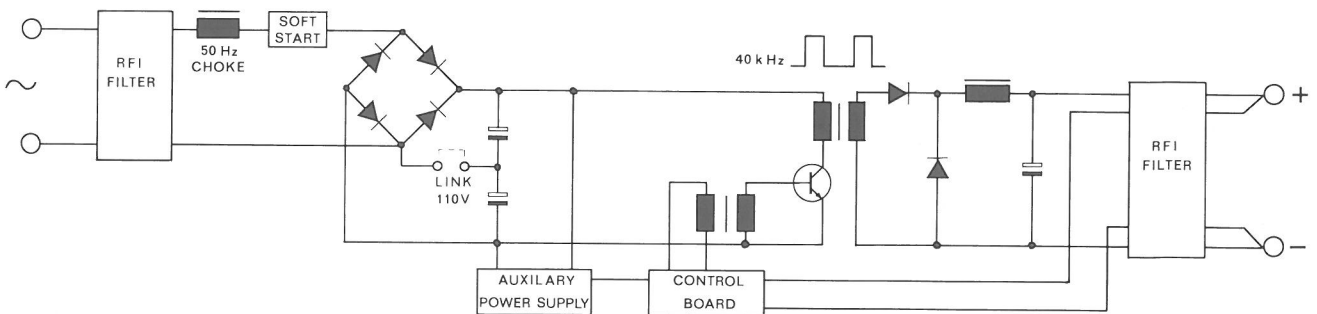
Insulation:

2.5 kV RMS for 1 minute between input and output and between input and case. 500 V DC between output and case.

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

Soft start: To limit input peak current

Choke input: For low mains distortion



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

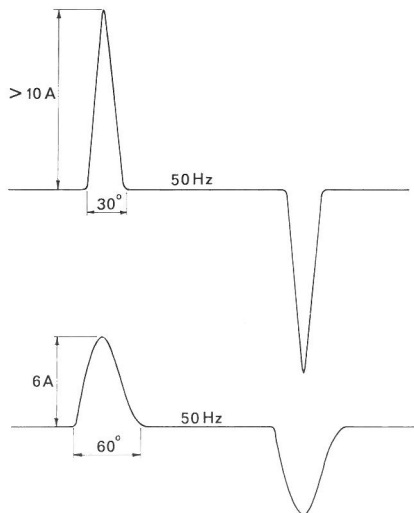
Wide input voltage range: 185-265 V 50-60 Hz or 250-360 V DC

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 waveform of the input current during operation.

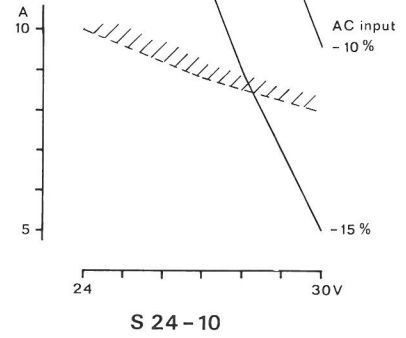
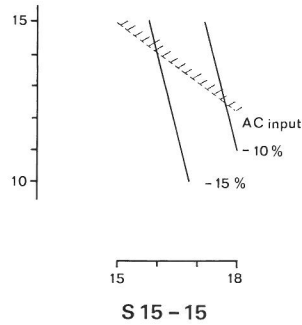
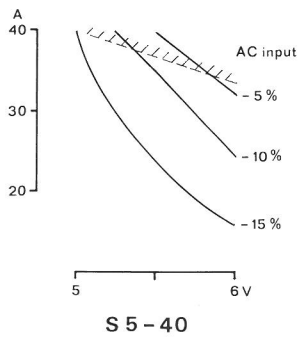
Because of the nature of the off line rectifying circuit used in an SMPS, high peak currents are taken from the mains which cause line frequency distortion. This low frequency distortion is not rejected by the RFI input filter. To overcome this problem, in the S-series an extra iron cored LF choke is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



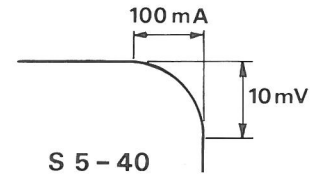
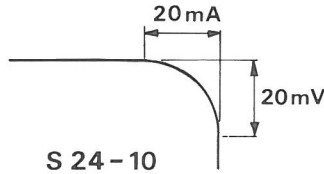
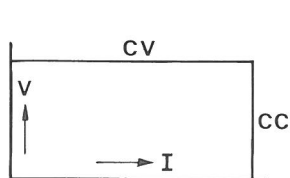
Input current of 240 W units of other manufacturers.

Input current of DELTA 240 W S-series.

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



Constant Voltage / Constant Current regulation:



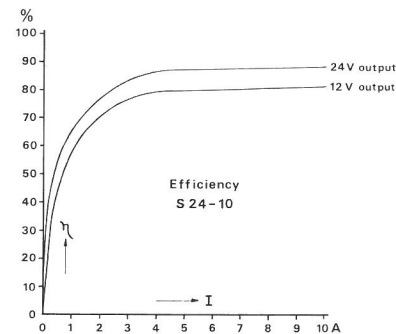
	CV	CC
<u>Load regulation (0-100%)</u>	10 mV	100 mA (S 5-40 200 mA)
<u>Line regulation (185-265 V AC)</u>	10 mV	50 mA (S 5-40 100 mA)
<u>Ripple and noise RMS/p-p</u>	20/50 mV	80/200 mV (S 5-40 200/500 mA)
<u>Temperature coeff. per °C</u>	1.10^{-4}	1.10^{-3}
<u>Recovery time</u>	0.5 mS for recovery to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

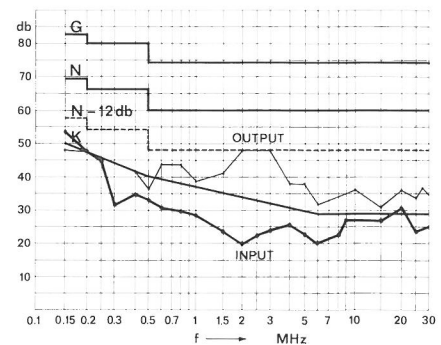
Input power at no load is about 6 Watts.



RFI suppression:

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

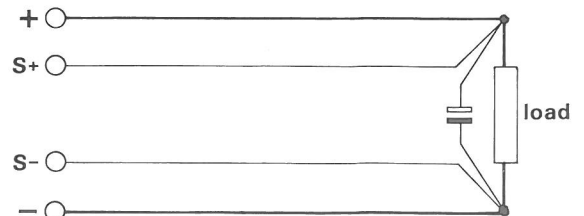
Typical RFI suppression measured at the input of the S-series.



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

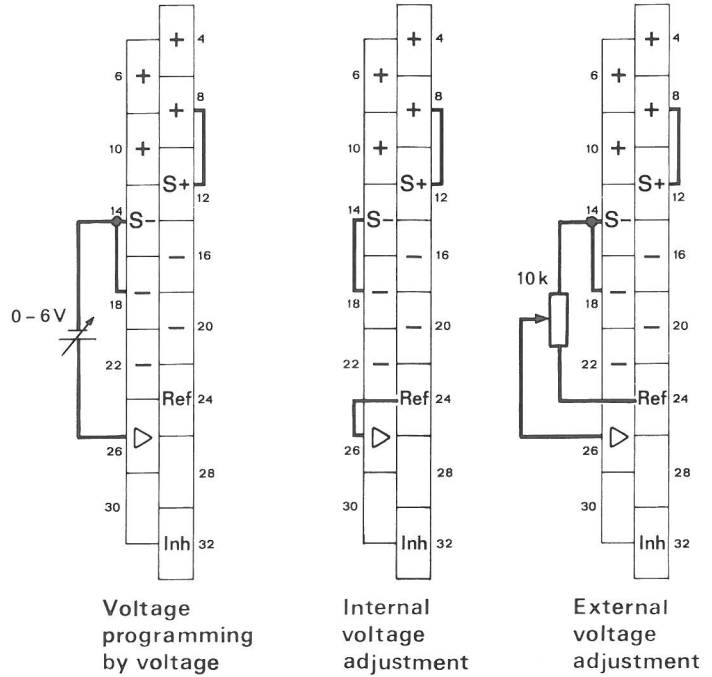
Remote sensing:

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. Programming of current is optional.



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:

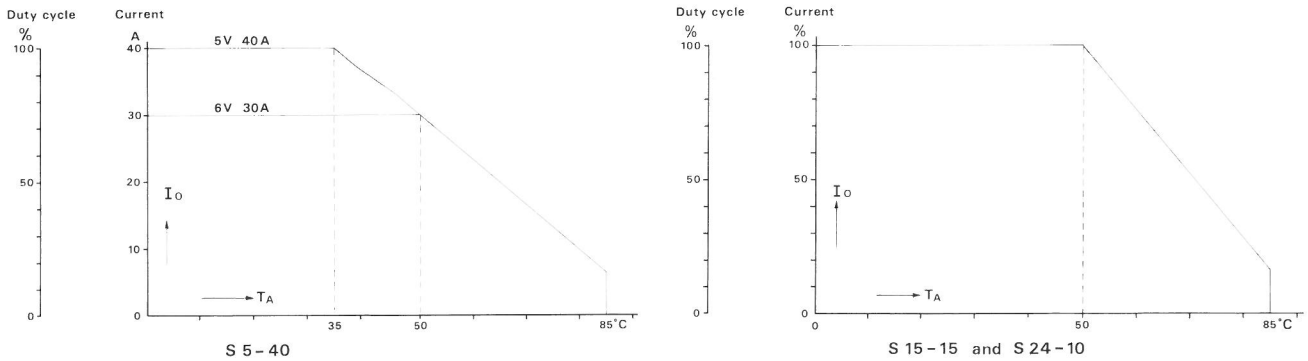
Is allowed up to 250 V combined sum

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:



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:

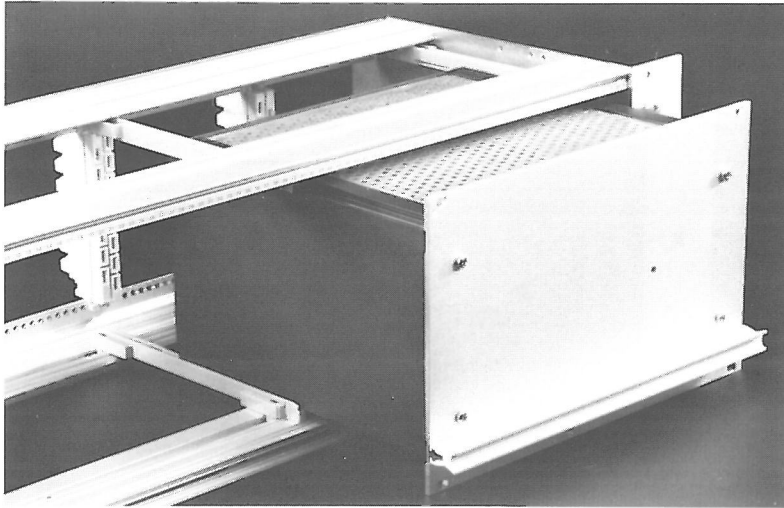
	Test voltage	Resistance (measured at 500 V)
Input - output	2.5 kV RMS (1 minute)	50 M Ohm
Input - case	2.5 kV RMS (1 minute)	50 M Ohm
Output - case	500 V RMS (1 minute)	50 M Ohm
	500 V DC (continuously)	

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

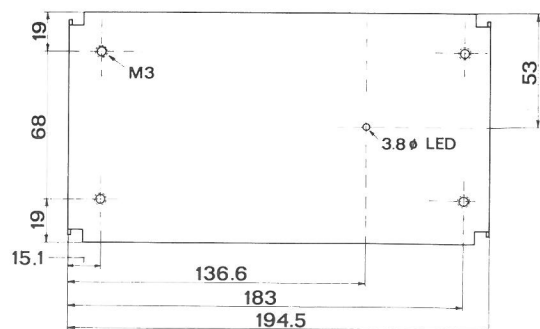
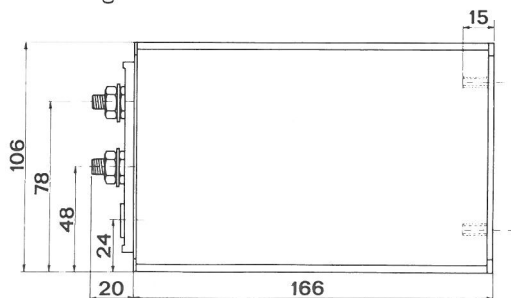
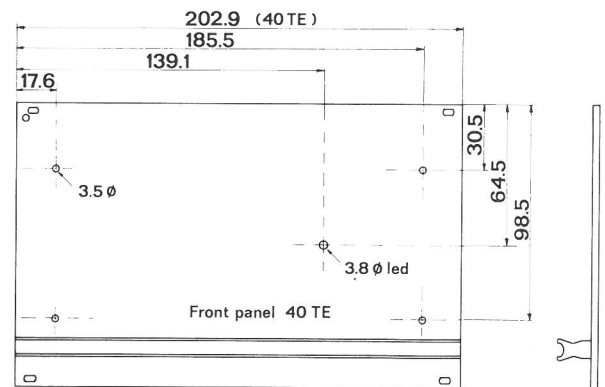
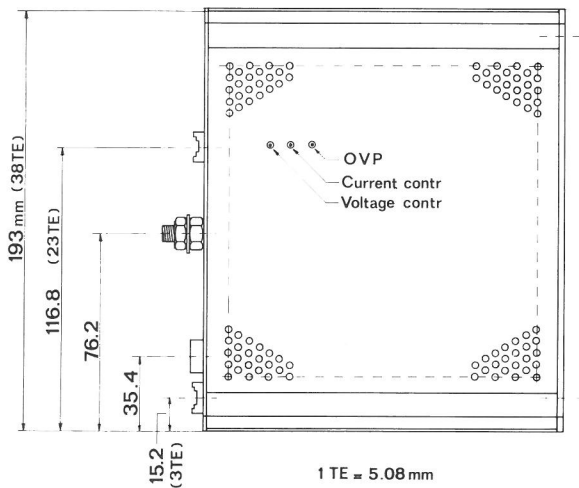
Weight: 2,75 Kg.

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

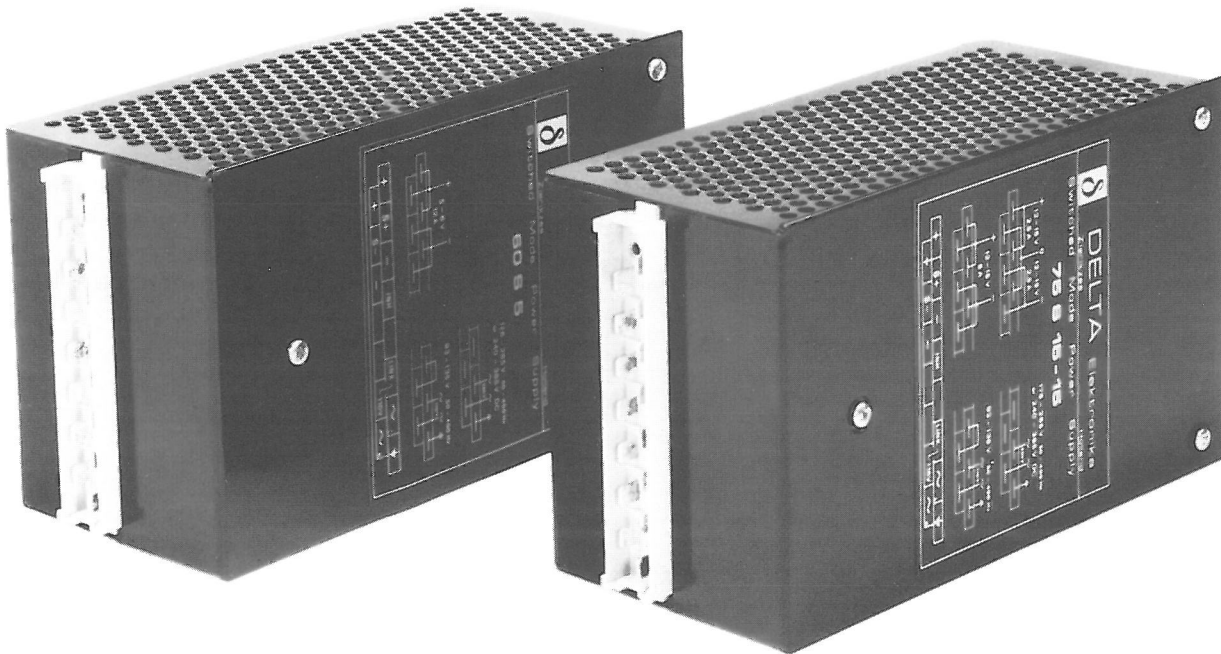
Mounting: Horizontal in order to allow a vertical air flow through the unit;
 a requirement for natural convection cooling.



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.



60 AND 75 W SWITCHED MODE POWER SUPPLIES

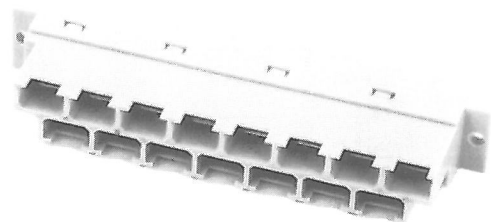
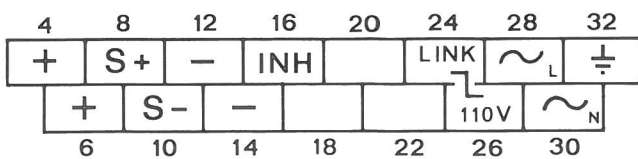


60 S 5	5- 6 V	12 A
75 S 15-15	2 x 12-15 V	2.5 A

The two outputs of the 75S15-15 can be connected as follows:

Single output	12 to 15 V	5 A	
Single output	24 to 30 V	2.5 A	
Dual output	\pm 12 to \pm 15 V	2.5 A	(Max. 3 A asymmetrically)
Two outputs	12 to 15 V	2.5 A	(Max. 3 A asymmetrically)

These power supplies have a very wide input voltage range which allows them to be used on 110 - 115 - 125 - 220 - 230 - 240 V, 50-400 Hz line voltages.



Connector: 15-pole H15 according to Din 41612. Connections can be made directly on to the power supply with Faston receptacles 4.8 x 0.8 mm or on to the H15 mating connector which is available with faston tabs 6.3 x 0.8 mm or with screw terminals.

Input voltage:

176 - 265 V AC 50-400 Hz
or 240 - 365 V DC

With external link

93 - 135 V AC 50-400 Hz

Voltage regulation:

15 mV for 0-100 % load variation
15 mV for 176-265 V line variation

This applies when the 75S15-15 is connected as a single output power supply. If used as a dual or as a master and slave see curves on next page.

Ripple + noise:

5V 12A	20 mV p-p
15V 5A	30 mV p-p
30V 2.5A	60 mV p-p

Transient response:

Load change 10 to 100 %
Max. deviation 500 mV
Recovery time 0.5 mS

Temp. coeff. of output voltage:

0.02 % per °C

Efficiency:

Typical 60S5 75% 75S15-15 80%
at full load and 220 V AC input.
Input current at no load is only
30 mA.

Overvoltage protection:

Internal SCR crowbar set to operate at approximately 7 volts on 60S5 and 18 V on 75S15-15 (36 V in series mode).

Hold-up time:

40 mS at full load and 220 V AC input.

Temperature range:

-10 to +50 °C at 100 % output current
Linear current derating to 20 % at 75 °C

Remote sensing:

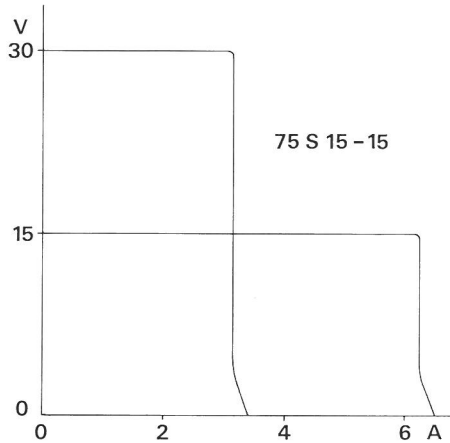
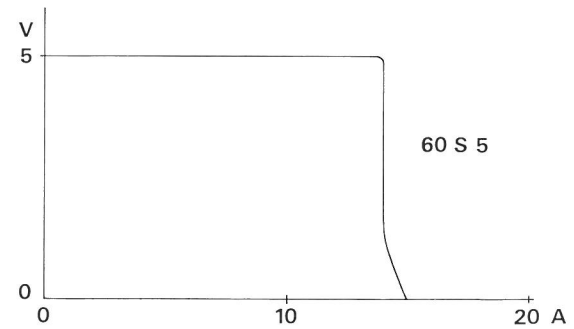
Fitted on both models.

Led lamp:

Led lamp on front end indicates output state.

Overload protection:

Constant current limit.



Inhibit:

A logic 1 (+5 V) between INH (pin 16) and S- (pin 10) shuts down the output.

Series operation:

Up to 250 V combined output.

Parallel operation:

Units may be connected in parallel. To protect the internal overvoltage protector a separate crowbar protector, set to 110 % of the output voltage, connected across the load, is recommended

RFI suppression:

Conducted interference complies with VDE 0875 curve N-12db on input and curve N on output.

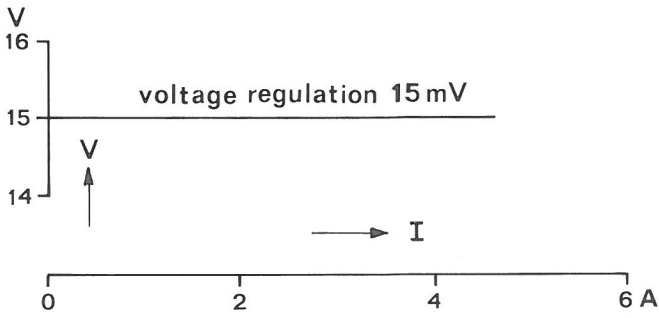
Insulation:

Input to earth (case)	: 2,5 kV RMS
	for 1 minute
Input to output	: 2,5 kV RMS
	for 1 minute
Output to earth (case)	: 500 V DC
Insulation resistance (500 V)	: 50 M Ohm

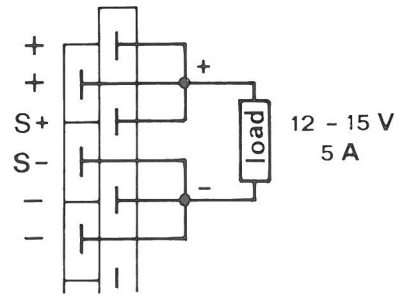
Weight:

Approximately 1.1 Kgs.

75S15-15 can be used in 4 different modes

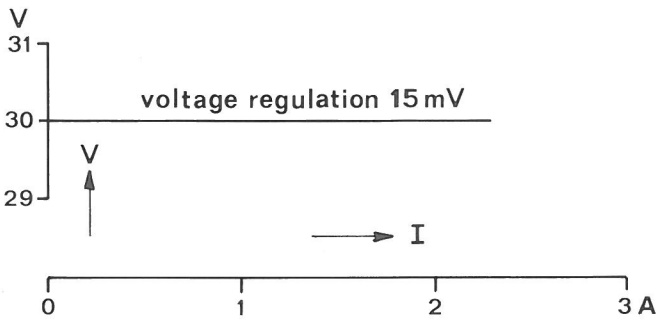


Single output 12 to 15 V 5 A

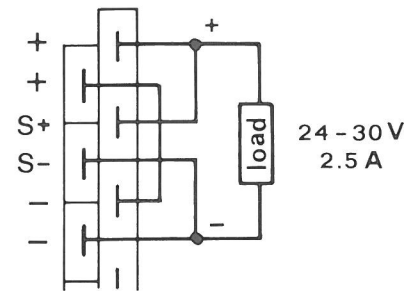


Parallel mode

Turn down the voltage adjustment about 15 turns if previously used in series mode, otherwise the over voltage protector will trip.

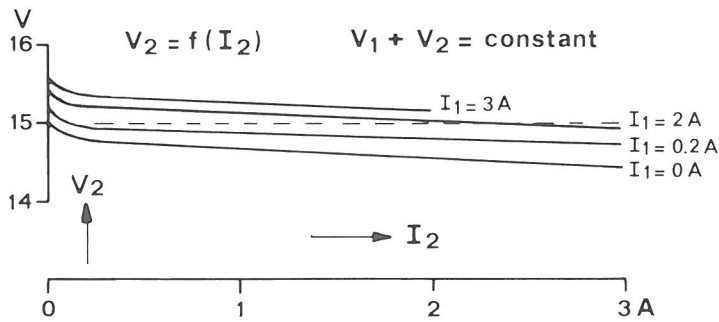


Single output 24-30 V 2.5 A

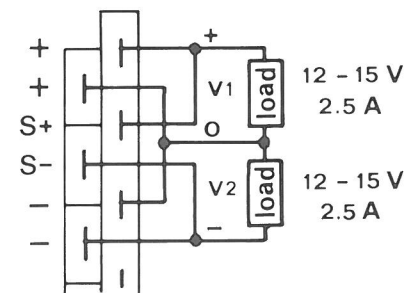


Series mode

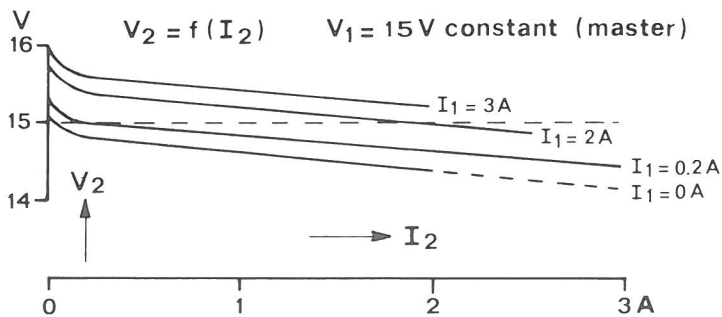
Turn up the voltage adjustment about 15 turns if previously used in parallel mode.



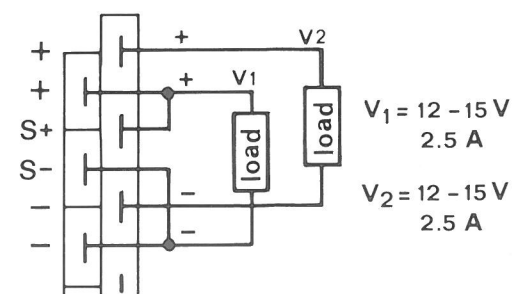
Dual output + and - 12 to 15 V 2.5 A



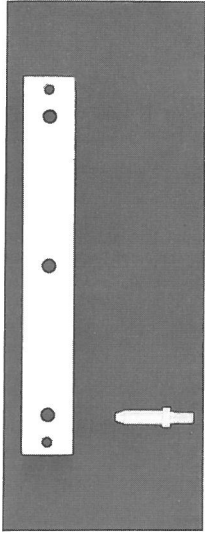
Dual mode



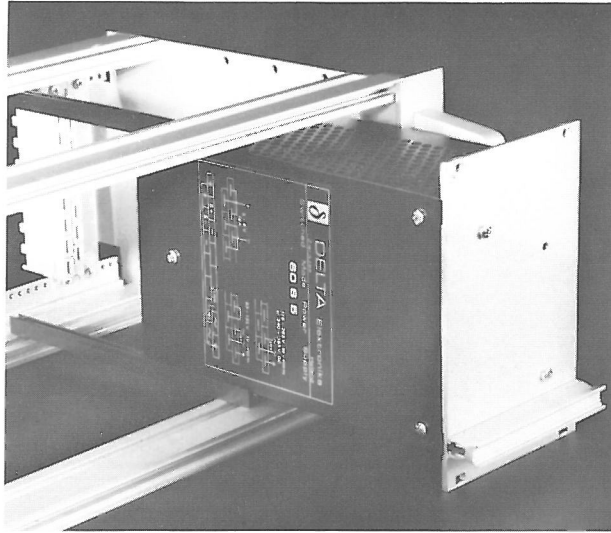
Two isolated outputs, each 12-15 V 2.5 A



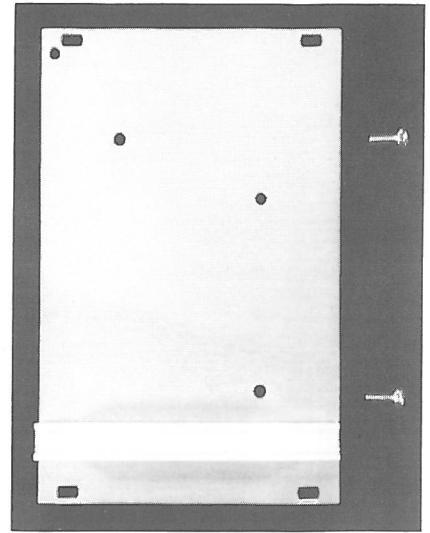
Master and slave mode



Polarizing system



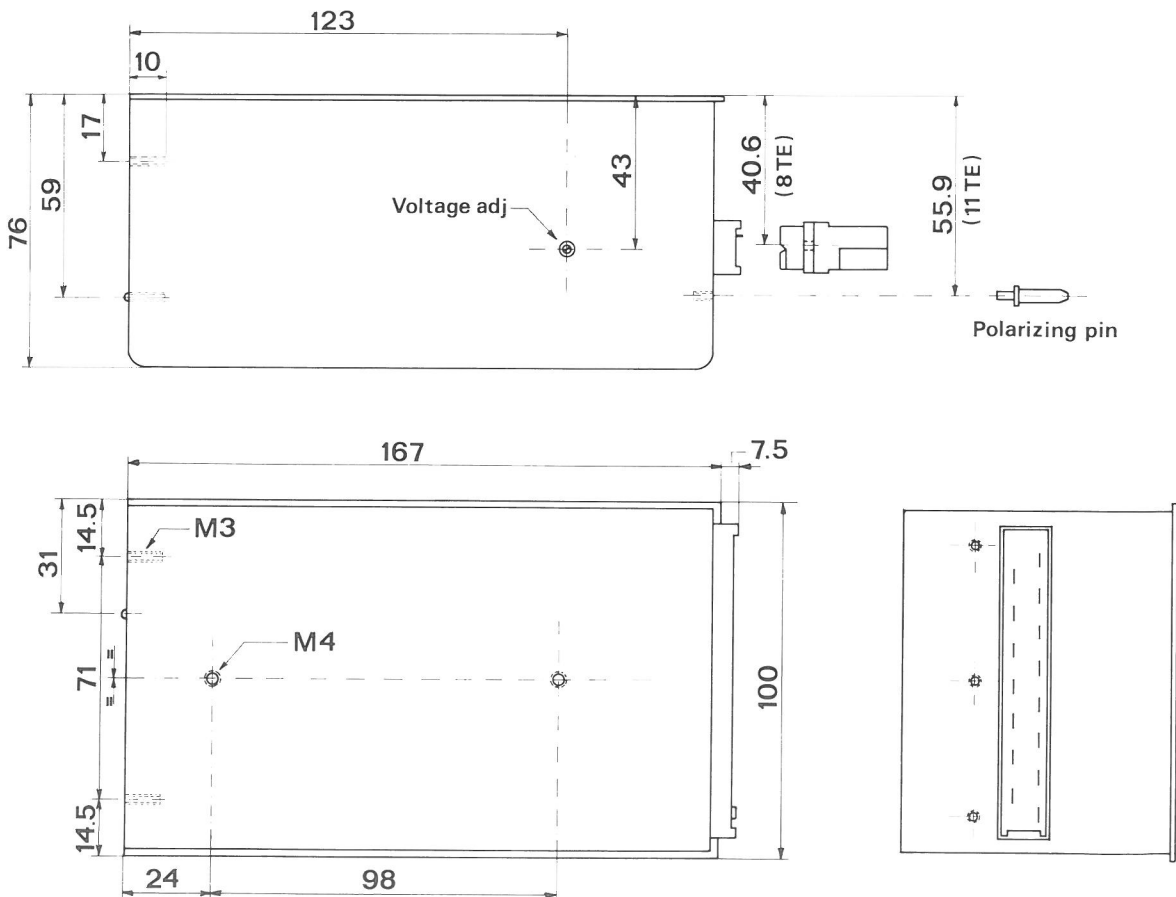
Dimensions of the 60S5 and 75S15-15 are according to DIN 41494 to fit into a Eurocard Rack.
Connector is H15 acc. to DIN 41612



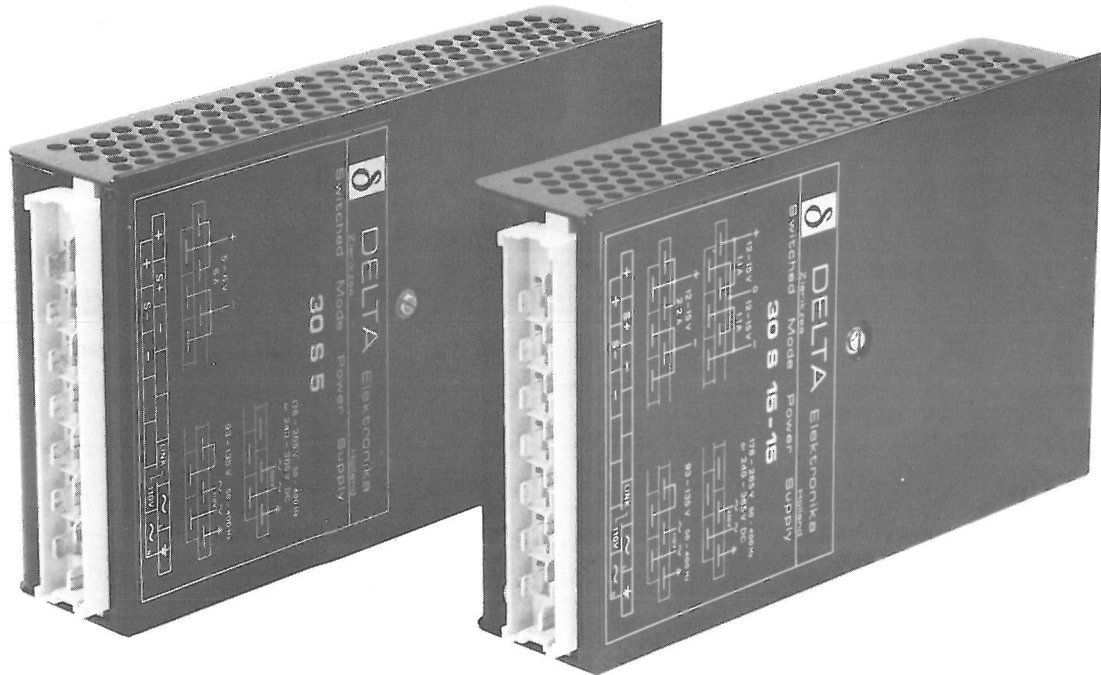
Elrück front panel 16 TE

A polarizing system, using a pin + plate arrangement, is available to prevent incorrect insertion of dissimilar units into the rack. Three positions of the pin are possible. The other two holes have to be covered by a screw.

The front panel and a polarizing system have to be ordered separately. A mating H15 connector is supplied with each unit.



30W SWITCHED MODE POWER SUPPLIES

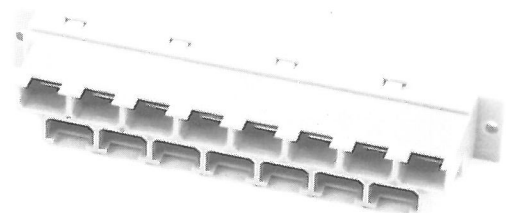
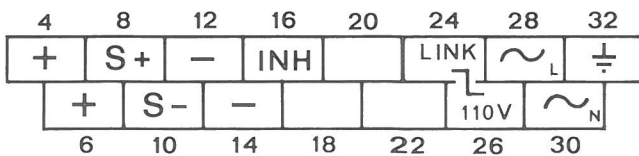


30S5	5 - 6 V	6 A
30S15-15	2 x 12 - 15 V	1.1 A

The two outputs of the 30S15-15 can be connected as follows:

Single output	12 to 15 V	2.2 A	
Single output	24 to 30 V	1.1 A	
Dual output	± 12 to ± 15 V	1.1 A	(Max. 1.5 A asymmetrically)
Two outputs	12 to 15 V	1.1 A	(Max. 1.5 A asymmetrically)

These power supplies have a very wide input voltage range which allows them to be used on 110 - 115 - 125 - 220 - 230 - 240 V, 50-400 Hz line voltages.



Connector: 15-pole H15 according to Din 41612. Connections can be made directly on to the power supply with Faston receptacles 4.8 x 0.8 mm or on to the H15 mating connector which is available with faston tabs 6.3 x 0.8 mm or with screw terminals.

Input voltage:

176 - 265 V AC 50-400 Hz
or 240 - 365 V DC

With external link

93 - 135 V AC 50-400 Hz

Voltage regulation:

10 mV for 0-100 % load variation
15 mV for 176-265 V line variation

This applies when the 30S15-15 is connected as a single output power supply. If used as a dual or as a master and slave see curves on next page.

Ripple + noise:

5 V	6 A	20 mV p-p
15 V	2,2 A	30 mV p-p
30 V	1,1 A	60 mV p-p

Transient response:

Load change 10 to 100 %
Max. deviation 250 mV
Recovery time 0.5 mS

Temp. coeff. of output voltage:

0.02 % per °C

Efficiency:

Typical 30S5 75% 30S15-15 80%
at full load and 220 V AC input.
Input current at no load is only
30 mA.

Overvoltage protection:

Internal SCR crowbar set to operate at approximately 7 volts on 30S5 and 18 V on 30S15-15 (36 V in series mode).

Hold-up time:

40 mS at full load and 220 V AC input.

Temperature range:

-10 to +50 °C at 100 % output current
Linear current derating to 20 % at 75 °C.

Remote sensing:

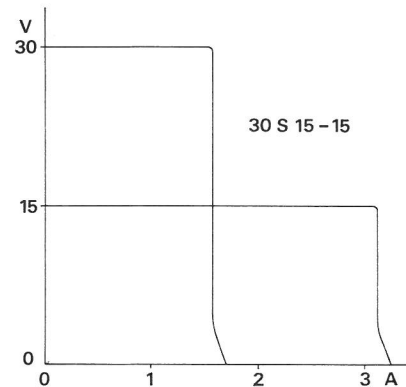
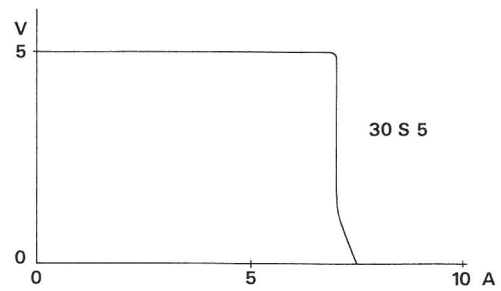
Fitted on both models.

Led lamp:

Led lamp on front end indicates output state.

Overload protection:

Constant current limit



Inhibit:

A logic 1 (+5 V) between INH (pin 16) and S- (pin 10) shuts down the output.

Series operation:

Up to 250 V combined output.

Parallel operation:

Units may be connected in parallel. To protect the internal overvoltage protector a separate crowbar protector, set to 110 % of the output voltage, connected across the load. is recommended.

RFI suppression:

Conducted interference complies with VDE 0875 curve N-12dB on input and curve N on output.

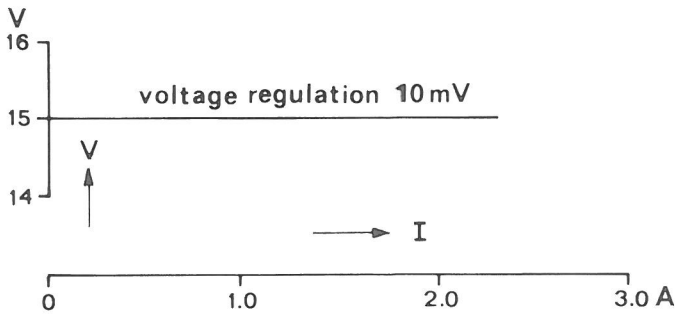
Insulation:

- Input to earth (case) : 2,5 kV RMS for 1 minute
- Input to output : 2,5 kV RMS for 1 minute
- Output to earth (case) : 500 V DC
- Insulation resistance (500 V) : 50 M Ohm

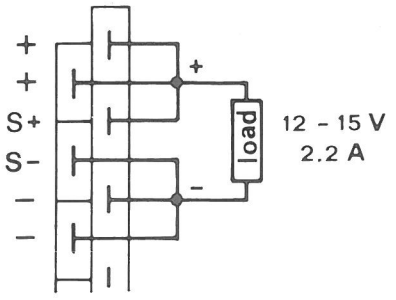
Weight:

Approximately 0,6 Kgs.

30S15-15 can be used in 4 different modes

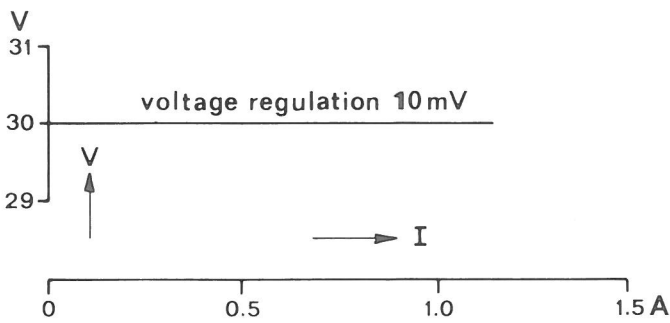


Single output 12 to 15 V 2.2 A

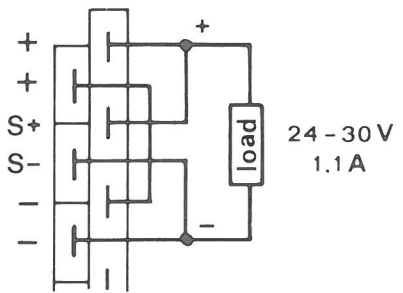


Parallel mode

Turn down the voltage adjustment about 15 turns if previously used in series mode, otherwise the over voltage protector will trip.

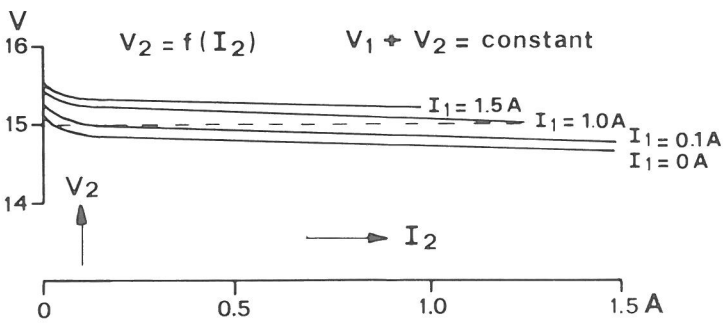


Single output 24-30 V 1.1 A

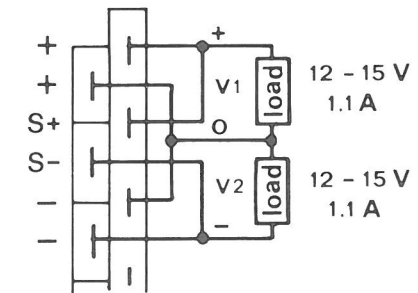


Series mode

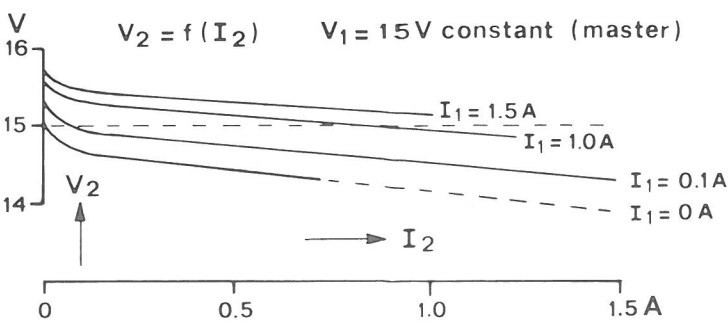
Turn up the voltage adjustment about 15 turns if previously used in parallel mode.



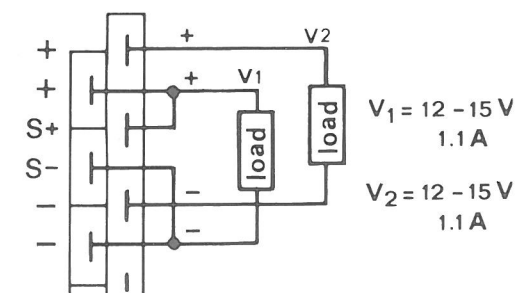
Dual output + and - 12 to 15 V 1.1 A



Dual mode

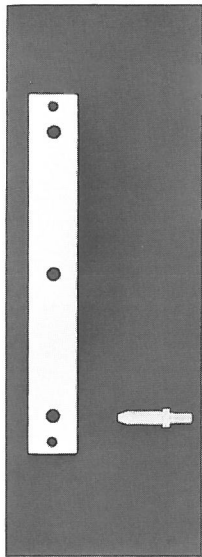


Two isolated outputs, each 12-15 V 1.1 A

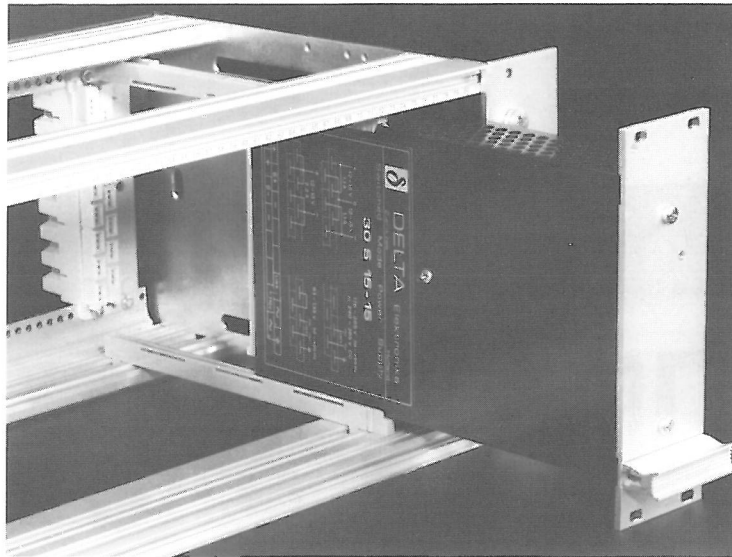


Master and slave mode

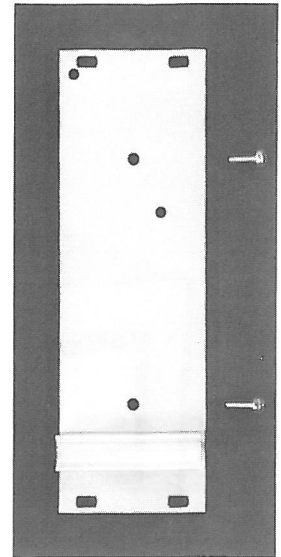
Note: Curves apply for serial nrs after D 90000



Polarizing system



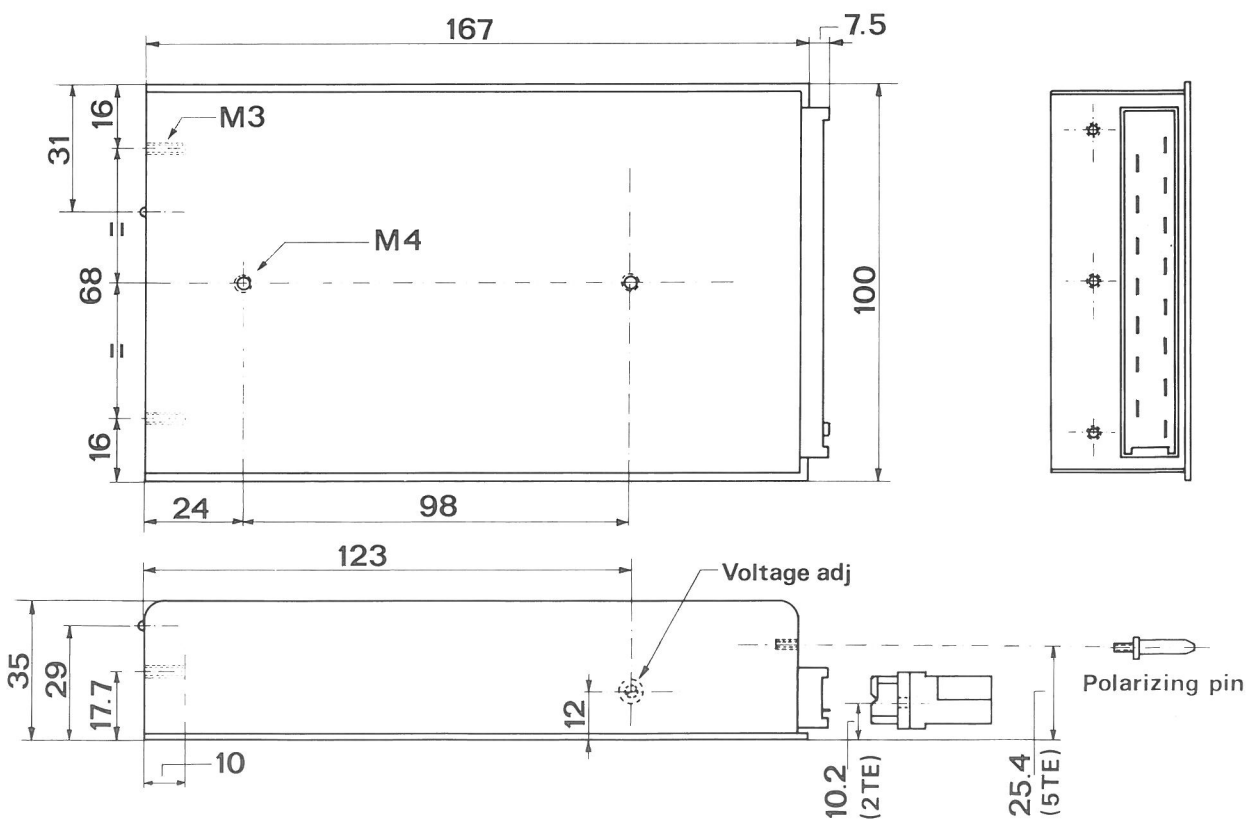
Dimensions of the 30S series are according to DIN 41494 to fit into a Eurocard Rack Connector is H15 acc. to DIN 41612



Elrück front panel 8 TE

A polarizing system, using a pin + plate arrangement, is available to prevent incorrect insertion of dissimilar units into the rack. Three positions of the pin are possible. The other two holes have to be covered by a screw.

The front panel and polarizing system have to be ordered separately. A mating H15 connector is supplied with each unit.



LINEAR LABORATORY POWER SUPPLIES



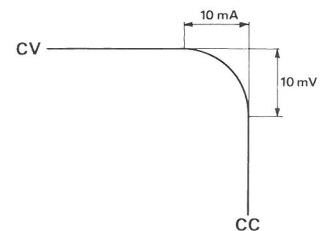
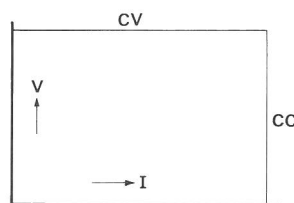
E-SERIES REGULATED POWER SUPPLIES

E 015-20 0-15 V 0-20 A

E 030-10 0-30 V 0-10 A

E 060-6 0-60 V 0-6 A

- * Constant voltage/constant current regulation with sharp cross-over. 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.



- * High efficiency thyristor pre-regulation followed by transistor series regulation. Thyristor pre-regulation causes no distortion on the line input voltage.
- * Ten turn potentiometer for voltage control, high resolution single turn potentiometer for current control.
- * Output and sense terminals both on front and rear panel.
- * Withstands continuous overload and short circuit conditions.
- * Output protected against spikes from inductive loads and against voltages of same or reverse polarity during parallel- and series-connection.
- * Parallel and series connection permitted up to 500 V combined voltage.

	CV	CC
Line regulation + / - 10 %	1 mV	3 mA
Load regulation 0 - 100 %	10 mV	5 mA
Ripple, r.m.s.	0.1 mV	1 mA
Temp. coeff., per °C	0.005 %	0.02 %
Recovery time	25 μS	-
Output impedance up to 100 kHz	0.1 Ohm	-

Ambient temperature (at full load):

E 030-10: 0 - 45 °C E 015-20 and E 060-6: 0 - 35 °C

Input voltage : 110/220 V 50 Hz (60 Hz on special order)

Insulation : 1.5 kV r.m.s. during 1 minute (VDE 0550) between input and output/case.
500 V DC between output and case.

Dimensions and weight : 418 x 140 x 325 mm, 20 Kgs.

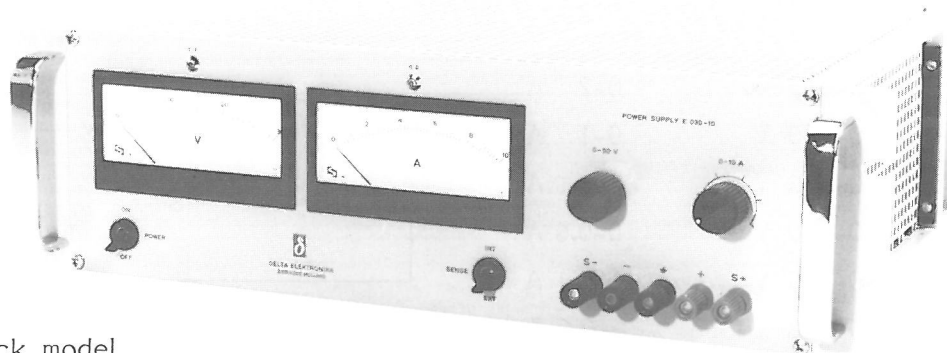
Programming:

Voltage by resistance : 0-5 kOhm, except E 060-6 0-10 kOhm

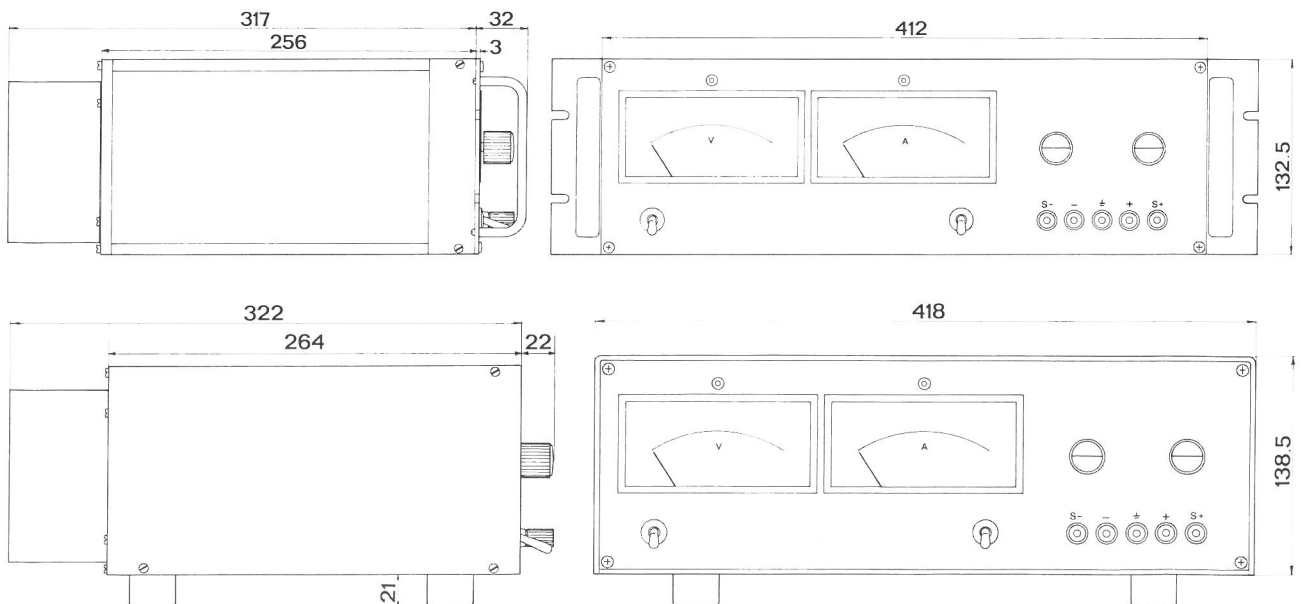
Voltage by voltage : 1 V per V, max. prog. speed 50 V per sec.

Current by resistance : 0-5 kOhm

Current by voltage : 0-1 V, max. prog. speed 1 sec. for 0 - 100 %

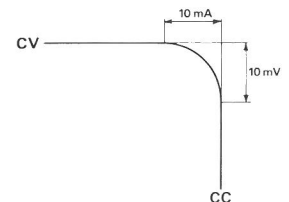
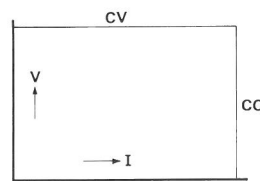


For 19" rack model
specify E 015-20 R etc.





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 018-0.6D	\pm 0- 18 V	\pm 0.6 A



Input voltage: 220 V, 50 Hz
other input voltages on request

Insulation: 1.5 kV r.m.s. during 1 minute between input and output/case (VDE 0550)
500 VDC between output and case

Max. ambient temp. (full load): 45 °C

Dim and W.: 219 x 93 x 154 mm 2.8 kgs
E 030-3 : 219 x 93 x 222 mm 5.7 kgs

- * Constant voltage regulation with sharp cross-over to constant current regulation
- * Ten turn potentiometer for voltage control
- * Can be continuously overloaded and short circuited
- * Parallel and series connections permitted up to 300 V.

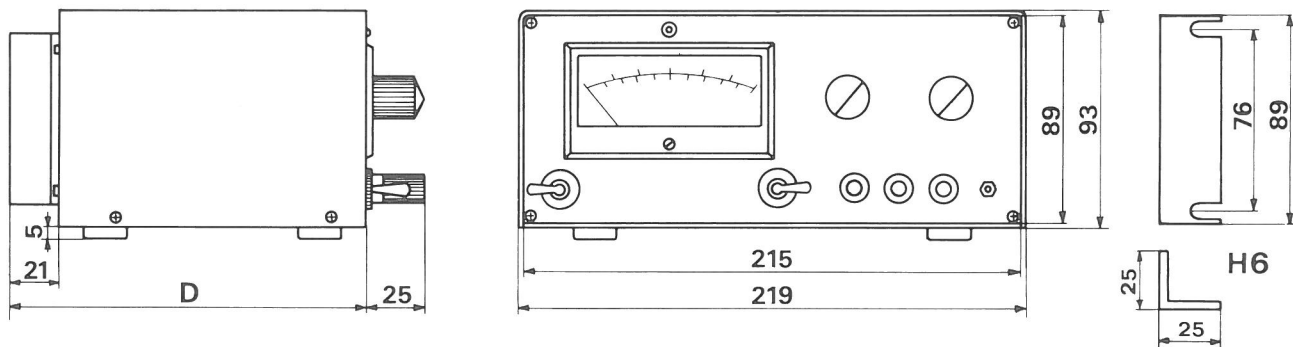
E 018-0.6D

The dual power supply E 018-0.6D is specially designed to power circuits with OP-AMP's. The positive and negative output are tracking and their ratio is variable between $\frac{1}{2}$ and 2. The current limit is fixed and coupled for positive and negative output, so that both outputs decrease if one is overloaded.

E 030-3 and E 0300-0.1

These models have a thyristor pre-regulation which keeps the dissipation low.

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	–



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.

LINEAR MODULAR POWER SUPPLIES



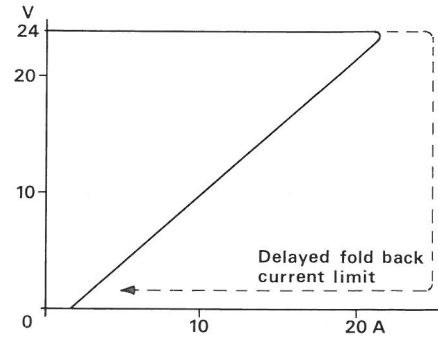
REGULATED POWER SUPPLY

M 24 - 20 24 V 20 A

- Input voltage : 110-117-220-234 V 50-60 Hz. Input current 4.5 A RMS at 220 V and full load.
- Insulation : 2.5 kV RMS for 1 minute between input and output/case
500 V DC between output and case.
Transformer according to VDE 0551.
- Output voltage : 24 V. Adjustment range 23-28 V (see curve for max. current).
- Voltage regulation : 0.02 % for a + 10 % to - 10 % line variation.
0.02 % for a 0-100 % load change.
- Temperature coeff. : 0.01 % per °C
- Drift : Less than 0.1 % per 8 hours under constant ambient and load conditions after 30 minutes warm-up.
- Ripple : 0.1 mV RMS. 0.5 mV p-p.
- Output impedance : Less than 100 milli-ohm at 100 kHz load frequency.
- Recovery time : 20 microseconds for recovery within 30 mV of steady state voltage after a step load change from 10 % to 100 %.
- Ambient temperature : Maximum 50 °C at full load with linear current derating to 20 % at 85 °C.

Current limit:

The M 24-20 has a fold back current limit characteristic. In spite of this the power supply can be used with non-linear loads such as incandescent lamps, provided the current rating of the lamp does not exceed 16 A. Series connected units can also be switched on into a lamp load.



Remote sensing: Is provided

Parallel and series connection:

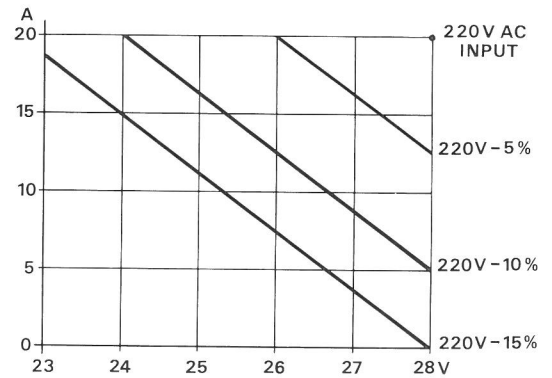
Parallel and series connection is permitted. In case of parallel connection the current limit potentiometer (normally adjusted at about 22 A) must be turned down to 20 A or less for better current sharing.

Static screens:

The input transformer has two screens. The first is connected to the case, the second to the output.

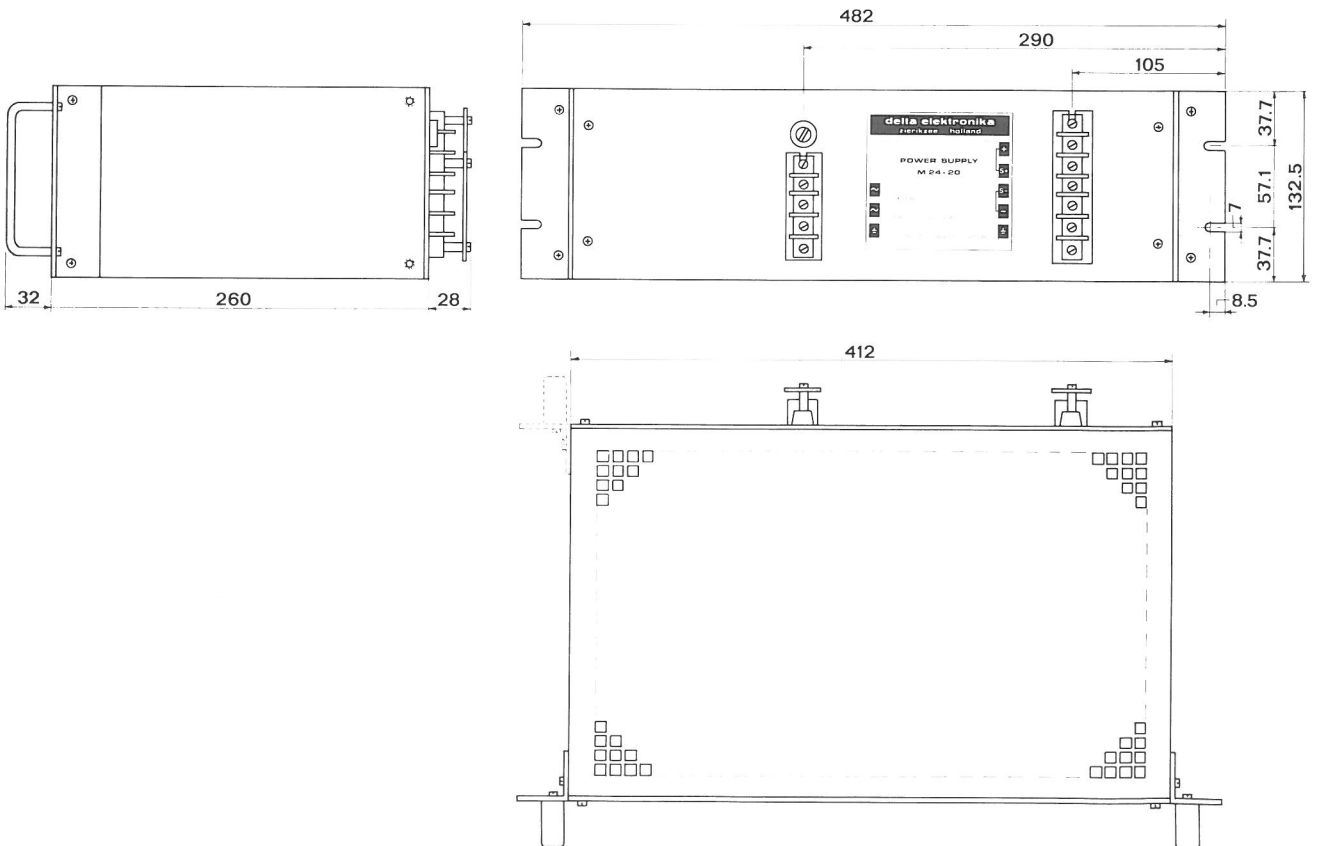
Maximum output current:

The M 24-20 is designed to supply still 24 V 20 A when the input drops 10 % below normal. The maximum VA the M 24-20 can supply depends on the lowest AC line voltage that can be expected during operation.

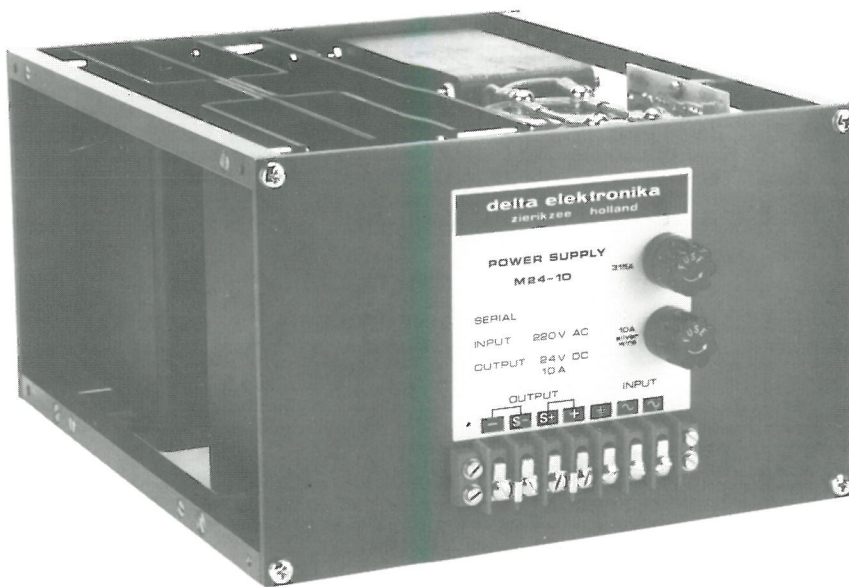


Size and weight:

412 x 132.5 x 260 mm. 18 kgs.



LINEAR MODULAR POWER SUPPLIES



M-SERIES

Half 19"

M 24-10	24 V	10 A
M 48-5	48 V	5 A
M 60-4	60 V	4 A
MV 15-10	4-15 V	10 A
MV 30-6	15-30 V	6 A

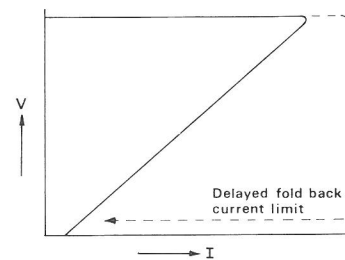
Quarter 19"

M 5-10	5 V	10 A
M 12-5	12 V	5 A
M 15-5	15 V	5 A
MD 12-2.5	+/- 12 V or 24 V	2.5 A
MD 15-2.5	+/- 15 V or 30 V	2.5 A

Line regulation +/- 10%	0.02%
Load regulation 0-100%	0.02% + 1 mV
Ripple, r.m.s./p-p	0.1/0.5 mV
Temp. coeff., per °C	0.01%
Recovery time, 10-100% load step	20 uS
Ambient temp. (full load)	max. 50 °C
Input voltage: 110-117-220-234V	50-400Hz
Insulation: 1.5 kV RMS during 1 min. between input and output/case (VDE 0550). Optional: with transformer VDE 0551 (2.5 kV RMS). 400 V DC between output and case.	

Dimensions and weight:

Half 19"	206 x 132.5 x 260 mm	8.8 kgs
Quarter 19"	103 x 132.5 x 260 mm	5.0 kgs



Current limit and lamp load

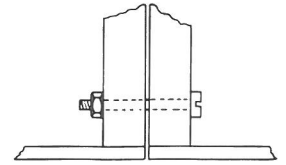
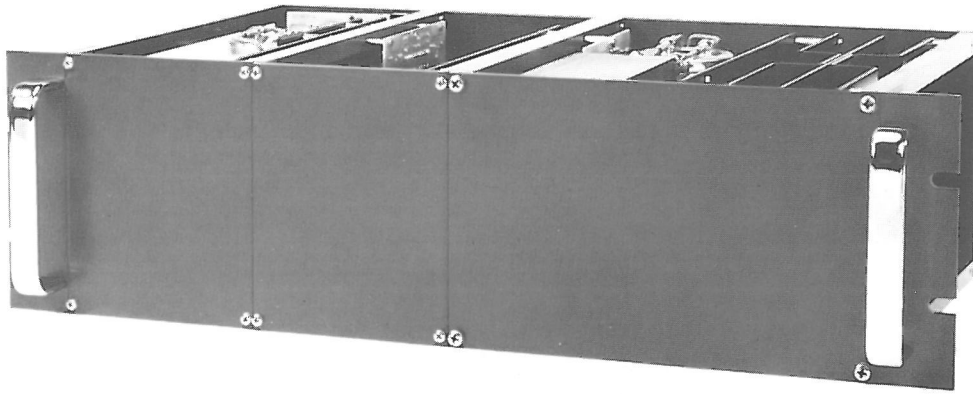
All units can continuously be overloaded and short circuited. In spite of the fold back overload characteristic, these units (except M 5-10 and MD's) can be used to power non linear loads like incandescent lamps, provided the load is below 80% of maximum. Even series connected units can be switched on in a loaded condition.

O.V.P.

M 5-10 has a built-in over voltage protector. For all other models the OVP is optional.

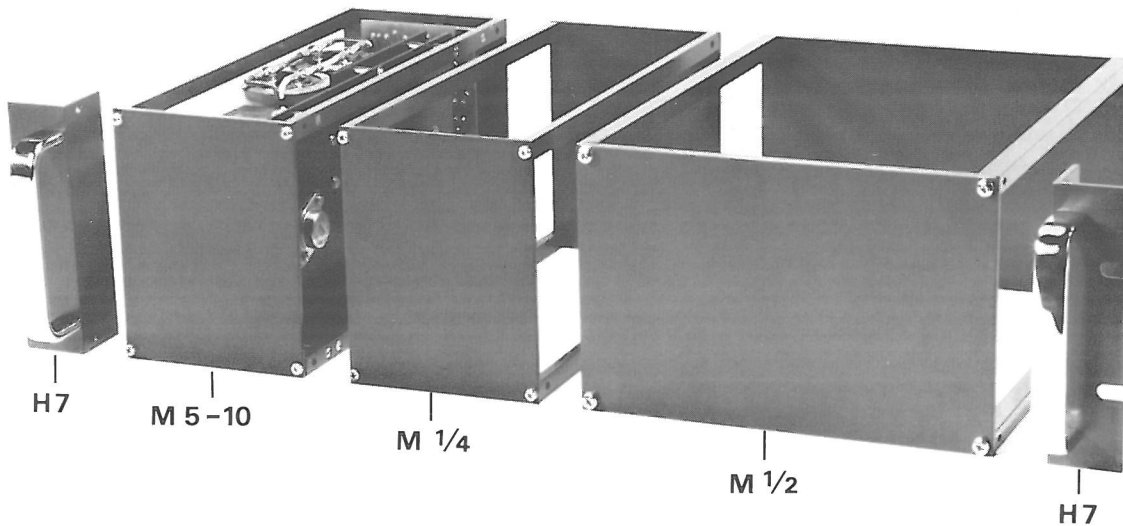
Voltage adjustment

MV models have a large output voltage adjustment range because they have several taps on the transformer secondary. It is important to select the right transformer tap to avoid overheating of the series pass transistor. Model M 5-10 is adjustable from 4 to 6 V, however with a current derating to 7.5 A at the output voltage extremes. All other models have an adjustment range of + and - 5% with a current derating to 80% at the output voltage extremes.

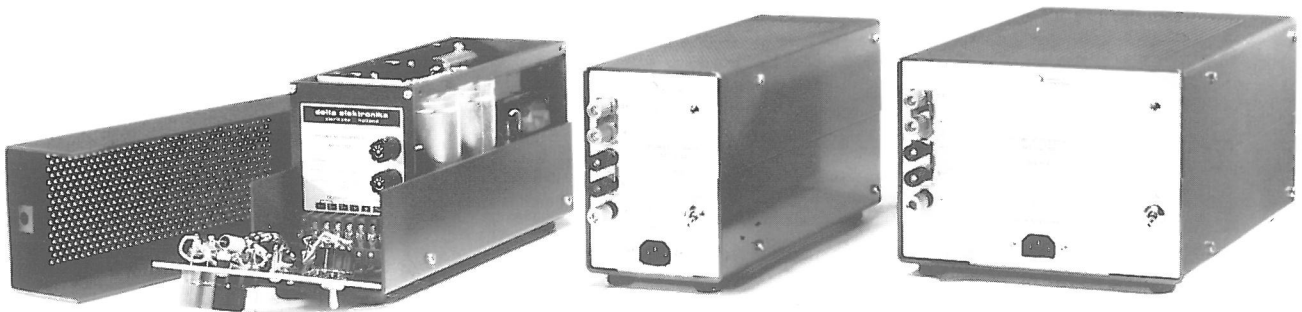


Rack mounting

On each side the beams have tapped holes M4. However to bolt together in the middle use steel M3 bolts and nuts through M4 holes. The brackets H7 can be mounted optionally against the front or rear panel to form a 19" rack unit.



Also empty half and quarter 19" modules are available.



Bench models

A unique construction enables a basic module to be converted into a bench model. The type number of a bench model is modified by the addition of a T, c.f. MT 24-10, MVT 15-10, etc.

LINEAR MODULAR POWER SUPPLIES



L 5-5B

L 5-5C

REGULATED POWER SUPPLIES L-SERIES

Single output:

L 5-5	5 V	5 A	4-6 V, but derate current to 80% at 4 and 6 V
L 24-1.5	24 V	1.5 A	22-26 V, but derate current to 80% at 22 and 26 V
LV 15-2	5-15 V	2 A	5-9 V, 9-12 V, 12-15 V (3 transformer taps)
LV 30-1	15-30 V	1 A	15-20 V, 20-25 V, 25-30 V (3 transformer taps)

Dual output:

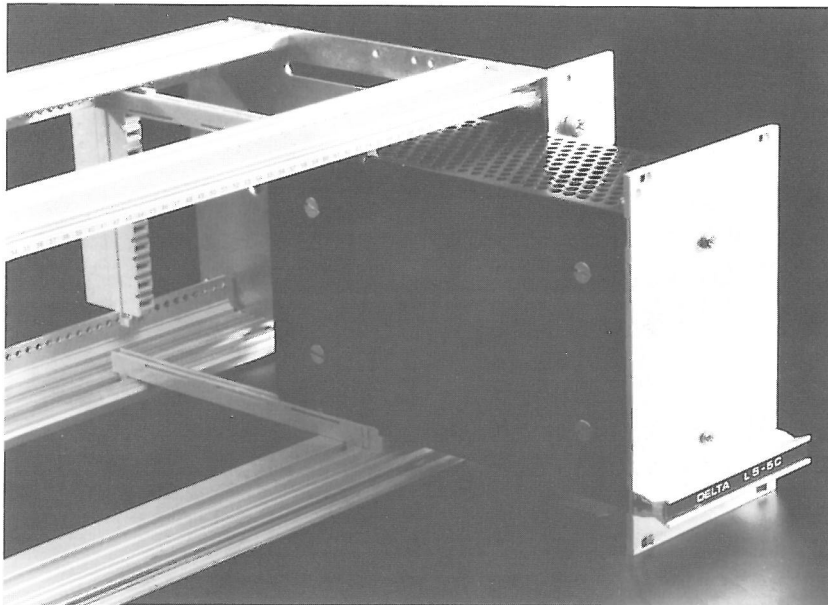
LD 15-1	± 15 V	1 A	12-15 V, but derate current to 80% at 12 V
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Triple output with 3 isolated, independently adjustable outputs:

LT 30	E ₁	5 V	3 A	4-6 V, but derate current to 2 A at 4 and 6 V
	E ₂	15 V	0.5 A	5-15 V, but derate current to 0.15 A at 5 V
	E ₃	15 V	0.5 A	5-15 V, but derate current to 0.15 A at 5 V

Version **B**: Module with screw terminals

Version **C**: Europa cassette according to DIN 41494 with H 11 connector according to DIN 41612



The C-version of the L-series fits a standard 19 inch Europa card rack.

Front panel width is 15 TE (= 75.9 mm).

One H 11 mating connector according to DIN 41612 is delivered with every unit.

Specifications of L 5-5, L 24-1.5 LV 15-2, LV 30-1 and LD 15-1

Input voltage	220 V 50-400 Hz standard 110 - 117 - 234 V available to special order	
Insulation	Input-output 1.5 kV RMS (1 minute), VDE 0550 Input-case 1.5 kV RMS (1 minute), VDE 0550 Output-case 250 V DC	
Current limit	Fold back current limit protects against overheating when overloaded or short circuited. Single output units have adjustable current limit. For parallel connection the current limit has to be adjusted to, or preferably below the nominal current.	
Line regulation	10 mV (5 mV L 5-5) for + or - 10% AC line variation	
Load regulation	10 mV for a 0-100% load variation	
Remote sensing	To compensate for voltage dropped across load leads	
Temperature coefficient	0.01% per °C	
Ripple	0.5 mV r.m.s., 1.5 mV p-p	
Recovery time	15 μS for recovery to within 30 mV of steady state voltage after a step load change from 10% to 100%	
Output impedance	Max 100 mOhm up to 100 kHz	
Ambient temperature	Max 40°C L 5-5, all other models max 50°C at full load and nominal input voltage	
Logic inhibit function	Logic 1 = inhibit (no output) Logic 0 = enable	
Dimensions and weight	B version 210 x 98 x 72 mm C version Cassette, width 15 TE (= 76,2 mm)	1,9 kgs 2,1 kgs



LT 30C

LT 30B

LT 30T

TRIPLE OUTPUT POWER SUPPLY FOR MICROPROCESSORS

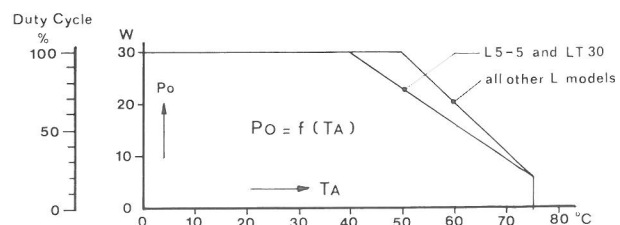
The LT 30 is available in 3 versions: LT 30B, LT 30C and a bench version LT 30T. The outputs of the bench version LT 30T are adjusted to +5 V, +12 V and -12 V and have a common zero. However, with the internal potentiometers the output voltages can be adjusted over the same ranges as the other versions.

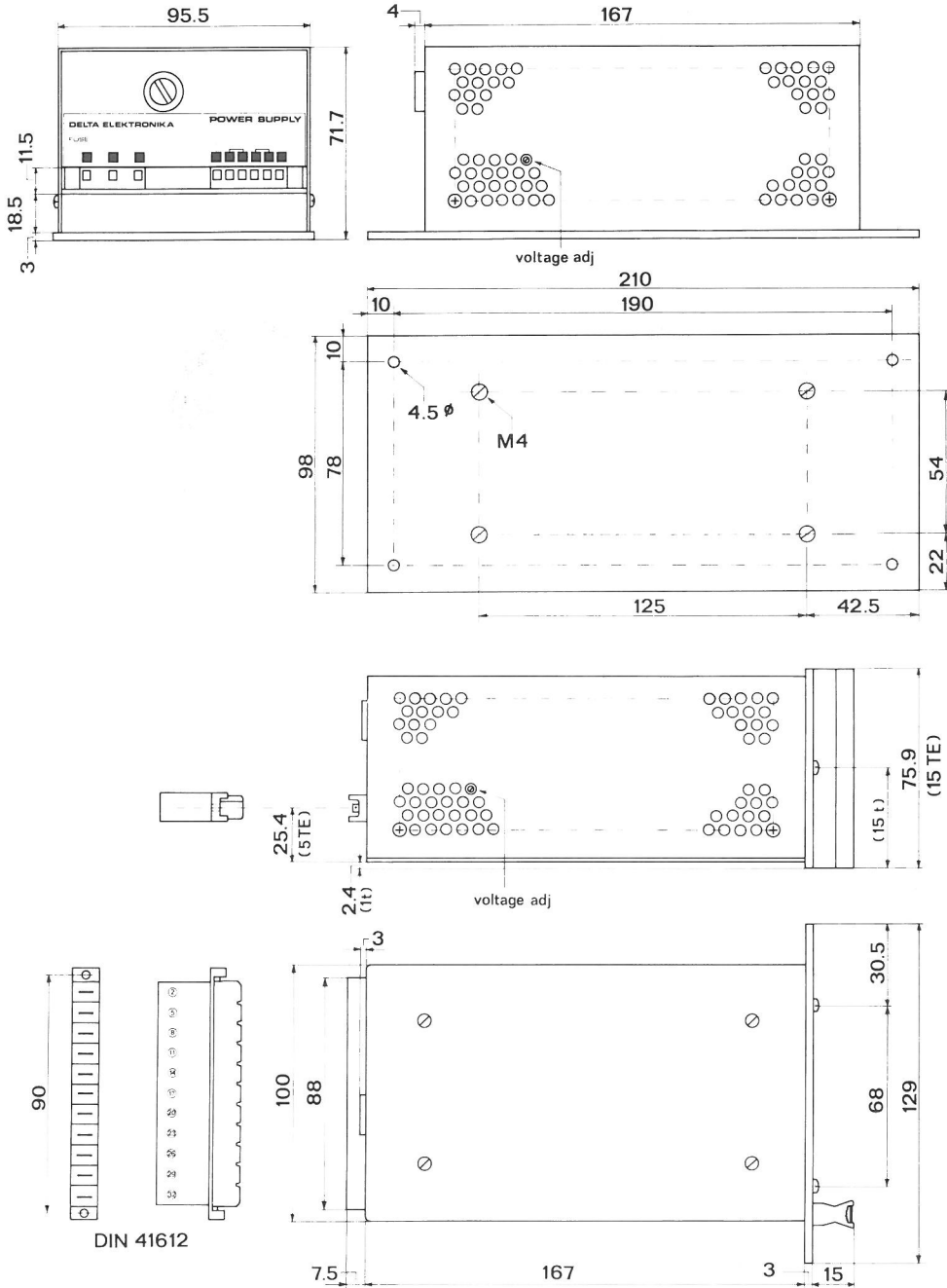
Specifications of the LT 30

Input voltage	220 V 50-400 Hz standard, other voltages on request	
Insulation	Input-output	1.5 kV RMS (1 minute), VDE 0550
	Input-case	1.5 kV RMS (1 minute), VDE 0550
	Output-case	250 V DC
	Output-output	50 V DC
Protection	All 3 outputs are fully protected against all overload and short circuit conditions. Each output is protected against over voltage by an adjustable SCR-crowbar over voltage protector.	
Ambient temp.	Maximum 40°C at full output power. For derating see curve below.	
	E₁	E₂ and E₃
Current limit	Fold back	Constant current + thermal shutdown
Line regulation (± 10%)	5 mV	30 mV
Load regulation (0-100%)	5 mV	30 mV
Temperature coefficient	2.10 ⁻⁴ per °C	2.10 ⁻⁴ per °C
Ripple RMS / p-p	0.5 / 1.5 mV	5 / 20 mV
Recovery time	15 μS	15 μS (after 10-100% load step)
Output impedance	0.1 Ohm	0.5 Ohm (up to 100 kHz)
Weight	Version B 2.0 kgs, C and T 2.2 kgs	

Maximum allowed output power as function of the ambient temperature.

Same characteristic shows the duty cycle at which full power can still be derived at high temperature and max. on time of 15 minutes.

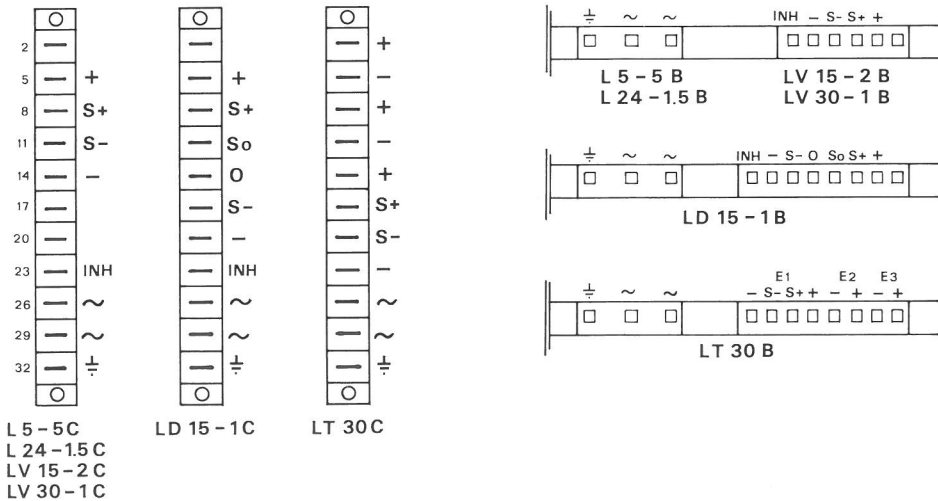




Version B
Module with screw terminals

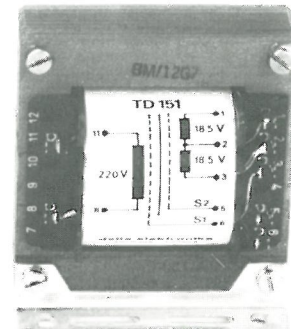
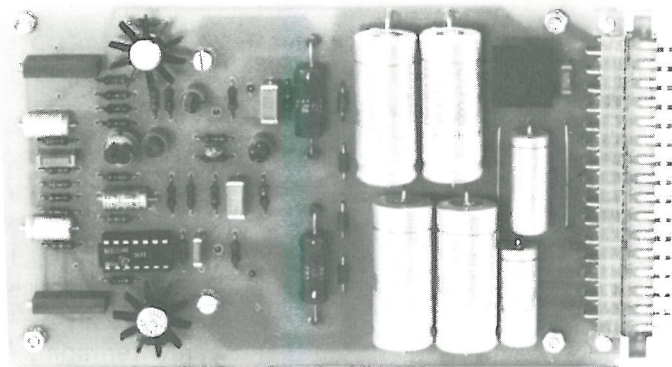
Version C
Cassette according to DIN 41494 with connector H 11 according to DIN 41612

A mating connector is always delivered with each unit



Always connect the sense points S+ to +, S- to - and So to O

LINEAR CARD POWER SUPPLIES

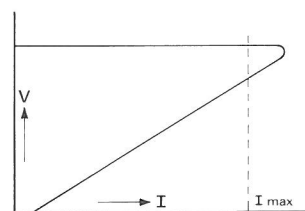


EUROPA CARD POWER SUPPLIES

Card type	DC output voltage	Output current	Adjustment ranges	Corresponding transformer voltages	Transformer
C 5-5	5 V	5 A	4- 6V derating to 4A	2 x 8.5V	T 55
C 24-1.5	24 V	1.5 A	22-26V derating to 1.3A	28V	T 2415
CD 15-1A	± 15 V	1 A	Pos. 12-15V, neg. 5-15V	2 x 18.5V	TD 151
CV 15-2	5-15 V	2 A	5- 9, 9-12, 12-15V	0-13-16-19V	TV 152
CV 30-1	15-30 V	1 A	15-20, 20-25, 25-30V	0-24-29-34V	TV 301
CV 60-0.6	30-60 V	0.6 A	30-40, 40-50, 50-60V	0-45-54-64V	TV 6006
U 125 at P 125	± 125 V	50 mA	± 115 -130V or single output 230-260V	2 x 145V	T 125

CD 15-1A: Below 15 V the max. current per section is $I_{max} = \frac{V_{pos} + V_{neg}}{30}$ A

	C-cards	U 125
Line regulation +/- 10%	5 mV	0.05%
Load regulation 0-100%	10 mV	0.05%
Exceptions C 5-5	5 mV	
CV 60-0.6	20 mV	
Ripple, r.m.s.	0.5 mV	0.5 mV
p-p	1.5 mV	1.5 mV
Temp. coeff., per °C	0.01%	0.01%
Recovery time, 10-100%	10 μ S	80 μ S
Ambient temp., full load	50 °C	50 °C



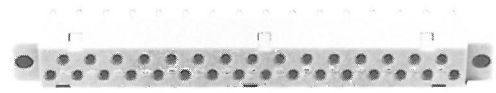
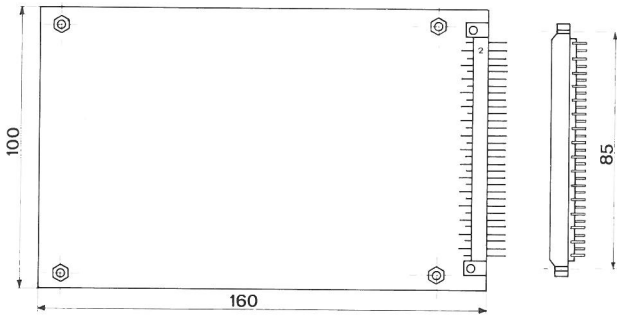
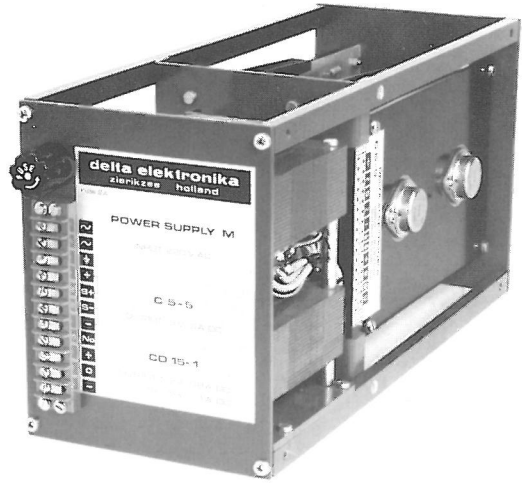
Fold back overload characteristic, except C 5-5 which has a constant current overload characteristic and a thermal shut down

C-cards are always delivered including the separate 31-pole female connector.

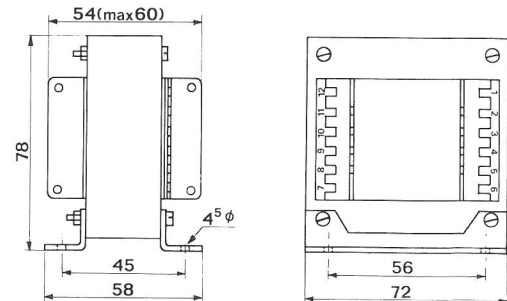
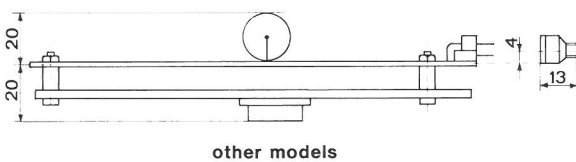
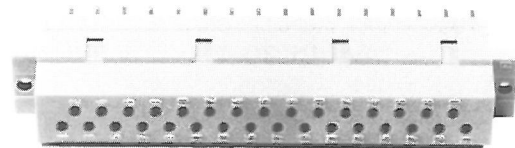
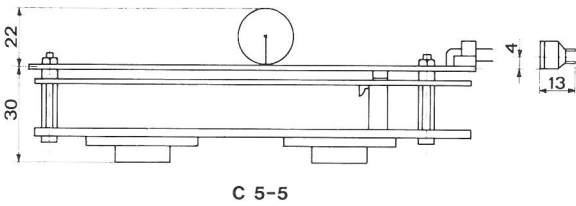
CARDS IN 1/4 19" M-UNITS

M-units 103 x 132.5 x 260 mm with one or two cards plus transformers built in are also available. All combinations are possible except two C 5-5 cards.

Ordering code: Prefix M followed by card type nrs, for example M/C 5-5 or with two cards M/C 5-5/CD 15-1

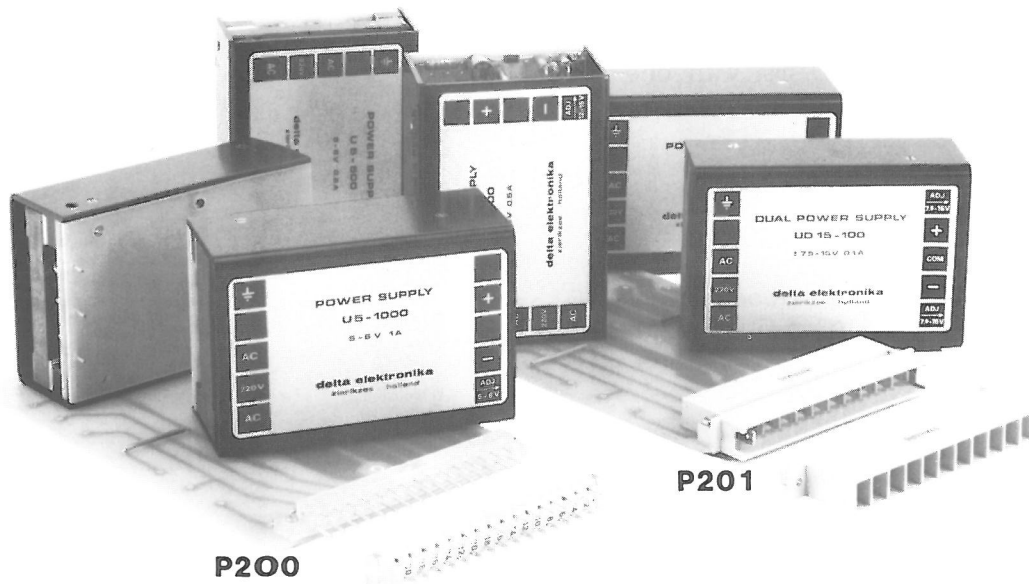


Connector: 31-pole according to DIN 41617 (fixing hole centres 85 mm). Also is available a separate 32-pole female connector acc. to DIN 41612 (fixing hole centres 90 mm) which accepts the 31-pole DIN 41617.



Standard transformers have only 220 V 50-400 Hz input. Multi-primary transformers (add A to type no) can be connected for 110-117-220-234 V 50-400 Hz.

Dimensions and weight: C 5-5	100 x 160 x 52 mm	0.4 kg
All other models	100 x 160 x 40 mm	0.32 kg
Transformers	72 x 78 x 60 mm	1.1 kg



U-SERIES (220V AC INPUT)

U 5-500	5-6 V	500 mA
U 5-1000/A	5-6 V	1000 mA
U 15-250	12-15 V	250 mA
U 15-500/A	12-15 V	500 mA
UD 15-100	\pm 7.5-15 V or 15-30 V	100 mA 100 mA
UD 15-200/A	\pm 12-15 V or 24-30 V	200 mA 200 mA

Line regulation + / - 10% except 5 V models	10 mV 5 mV
Load regulation 0-100%	10 mV
Ripple, r.m.s./p-p	0.5/1.5 mV
Temp. coeff., per °C	0.01 %
Recovery time, 10-100% load step	10 μ S
Output impedance up to 100 kHz except 5 V models	0.2 Ohm 0.1 Ohm
Ambient temp. at full load	max. 50 °C
Input voltage: 220 V 50-400 Hz for U 5-500, U 15-250 and UD 15-100	

Europa cards for 1 or 2 U-units:

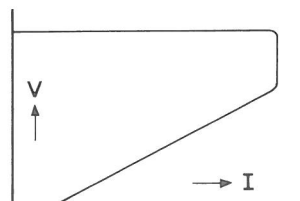
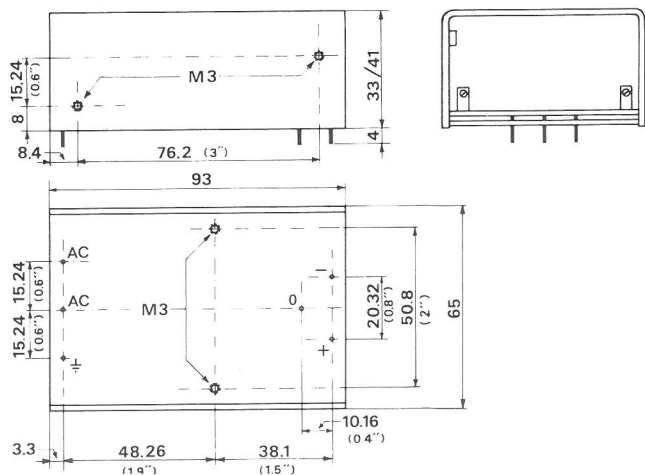
P 200 with 31-pole DIN 41617 connector
P 201 with 11-pole DIN 41612 connector

110/220 V for U 5-1000/A,
U 15-500/A and UD 15-200/A

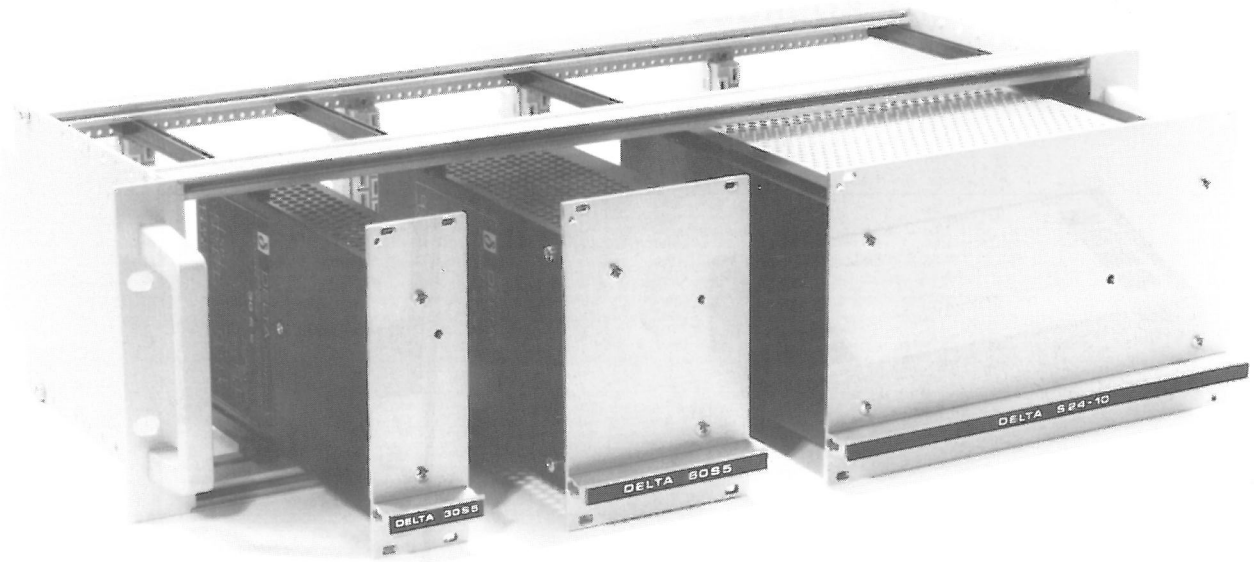
Insulation: 1.5 kV during 1 minute between input
and output/case (VDE 0550).
250 VDC between output and case.

Dimensions and weight:

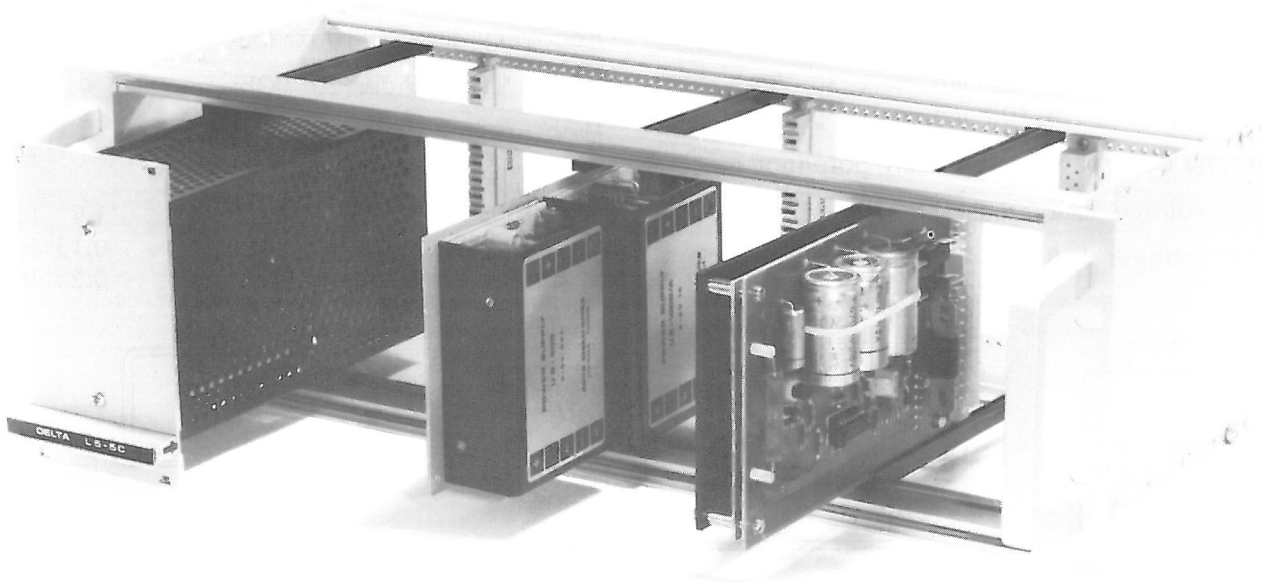
3 Watt models 93 x 65 x 33 mm	0.40 kgs
6 Watt models 93 x 65 x 41 mm	0.55 kgs



Fold back overload characteristic to limit dissipation, except UD 15-100 which has a constant current overload characteristic.

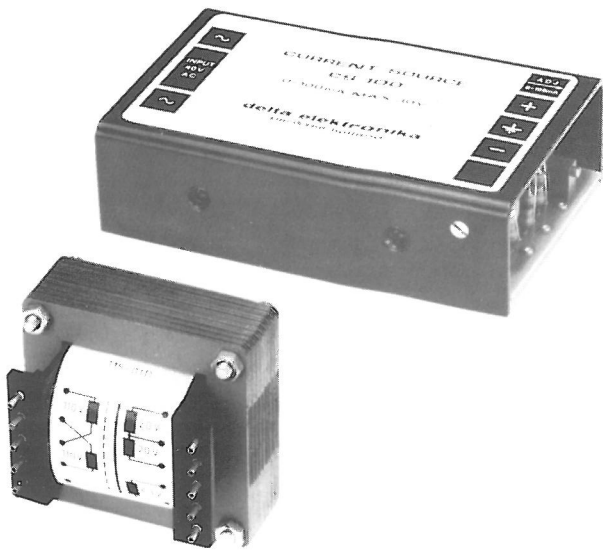


All switched mode modular power supplies have Eurodimensions in accordance with DIN 41494 and fit in standard 19" Eurocard racks of 3 units height (132.5 mm). Front panel widths are 8 TE (30 Watts), 16 TE (60-75 Watts), and 40 TE (200-240 Watts). All units are fitted with the new 15-pole H15 connector according to DIN 41612 (fixing hole centres 90 mm), which is specially designed for power supplies (max current 15A per contact and 2.5 kV insulation).



The linear L-series and the cards P 201 carrying U-series have an 11-pole H11 connector according to DIN 41612. The C-cards still have the old 31-pole connector acc. to DIN 41617 to keep them interchangeable in existing systems. However a 32-pole mating connector acc. to DIN 41612 (fixing hole centres 90 mm) accepting the 31-pole (DIN 41617) can be ordered separately. This mating connector makes it possible to use the cards in the DIN 41612 system.

CONSTANT CURRENT SOURCES



CS 100 MODULE

Current range: 0-100 mA, max. 30 V
Open voltage limit 42 V

Input voltage: 40 V 50-400 Hz
Transformer : T 15-0.1D (110/220V)

CST 100 BENCH MODEL

Current ranges: 0- 20 mA, max 30 V
0-100 mA, max 30 V

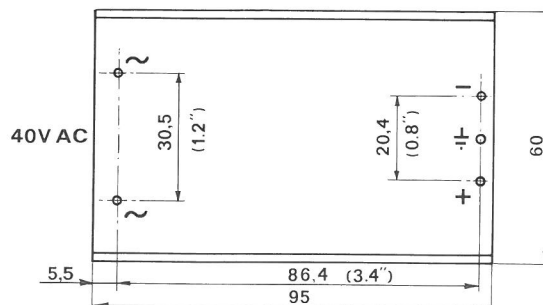
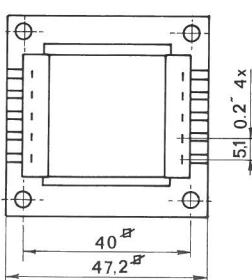
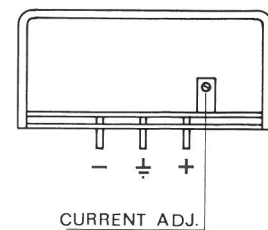
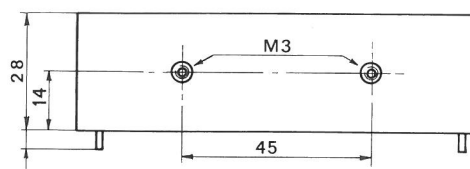
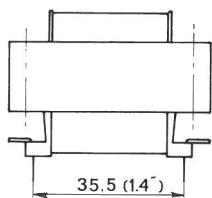
Current control with ten turn potentiometer
Open voltage limit adjustable from 15 to 30 V
Input voltage: 110/220 V, 50-400 Hz

SPECIFICATIONS

Current regulation	
+/- 10% input voltage change	1 μ A
100% load change	1 μ A
Ripple current, r.m.s./p-p	5/15 μ A
Current temp. coeff., per $^{\circ}$ C	0.005 %
Stability per 8 hours, after 20 min	0.01 %
Recovery time, 0-100% load step	20 μ s
Output impedance: 20 MOhm parallel 4 nF	
Max. ambient temp., full load	50 $^{\circ}$ C

Dimensions and weight:

CST 100:	84 x 138 x 144 mm	1.4 kgs
CS 100 :	95 x 60 x 28 mm	0.13 kgs
Trafo :	48 x 48 x 37 mm	0.25 kgs



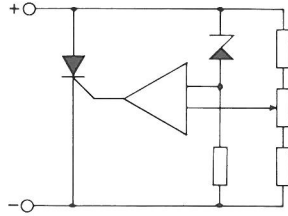
T 15-0.1D

CS 100

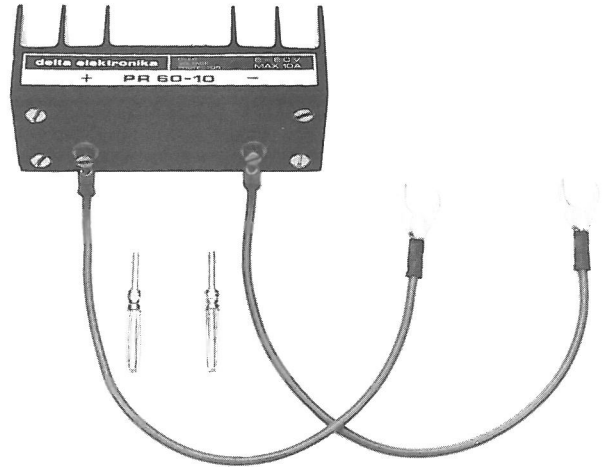
OVERVOLTAGE PROTECTORS

CIRCUIT DESCRIPTION

The protected DC voltage will be short circuited by a heavy duty thyristor when this voltage exceeds the set trip voltage level.



Type	Maximum short circuit current
PR 60-3	100 A for 10 mS
	10 A continuously if mounted to a cooling surface with a thermal resistance of 2 °C per Watt
	3 A continuously if mounted free
PR 60-10	100 A for 10 mS
	10 A continuously
PR 60-20	100 A for 10 mS
	20 A continuously



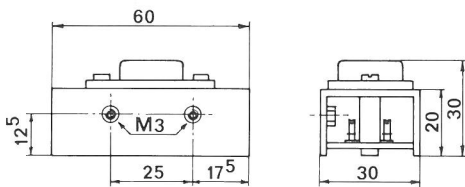
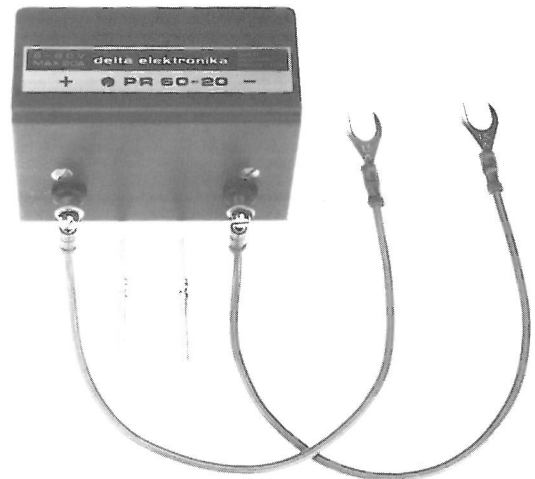
SPECIFICATIONS

Trip voltage adjustment range : 6-60 V, resolution 0.2 V

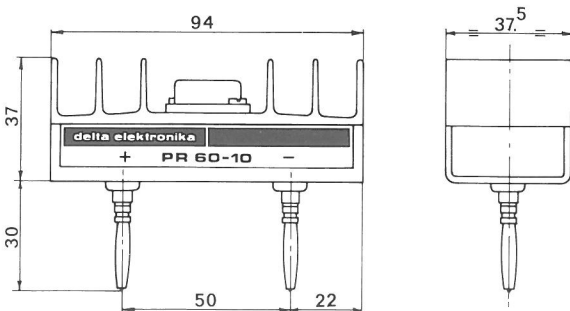
Temp. coeff. of trip level : 0.05% per °C

Holding current : 50 mA

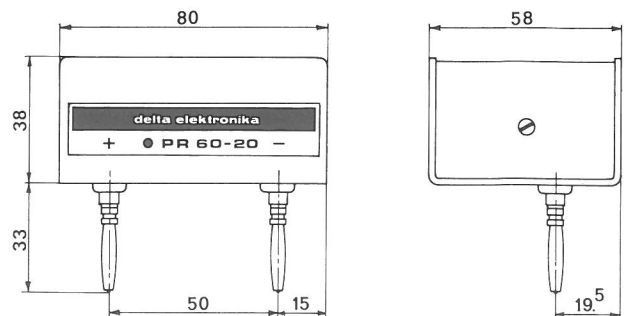
Reverse connection: Does not damage the OVP, but in this situation it is ineffective.



PR 60-3



PR 60-10



PR 60-20

GENERAL INFORMATION

PARALLEL OPERATION OF POWER SUPPLIES

Laboratory power supplies:

These models can be used in parallel without any restriction.

Modules:

The current limit of these models is usually set at 110% of rated value. For parallel operation it is recommended that the current limit is set back to 100% or lower to prevent overheating, because there is no automatic built in current sharing. Under these conditions one unit supplies maximum current while the other supplies the remainder.

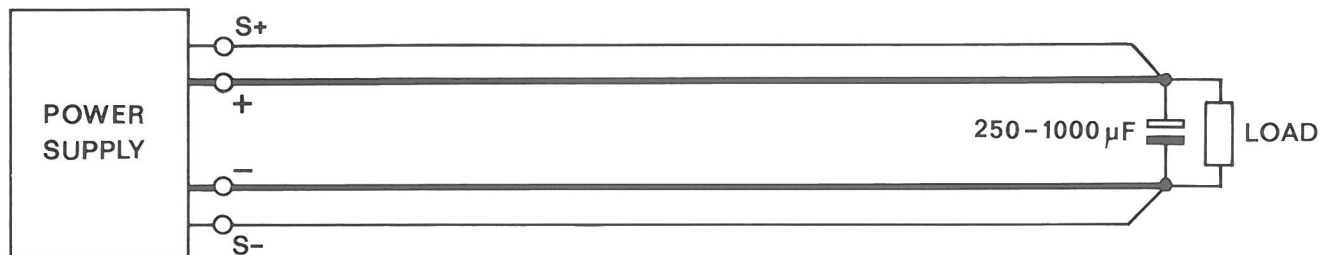
SERIES OPERATION

The number of units that can be operated in series is only limited by the maximum permissible DC voltage between output and case, which is specified for each unit.

The output circuit of practically all models incorporates a parallel diode to protect against reverse voltages from outside sources. This is necessary because in case of series operation it can occur that the output of the unit with the lowest current limit setting is reversed in polarity by the others if the series circuit is overloaded. The protection diode can handle at least the same maximum continuous current as the power supply itself.

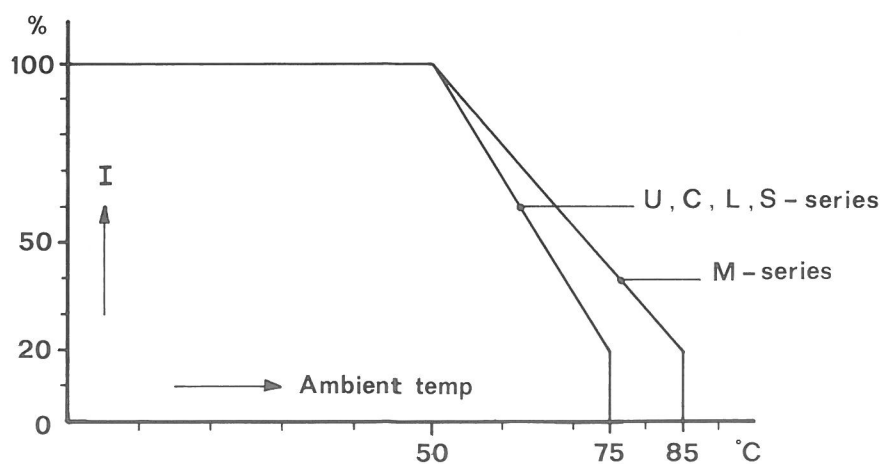
Units are also protected against external voltage sources of the same polarity. This protection usually can handle voltages up to 150 or 200% of the rated value of the power supply without damage.

REMOTE SENSING



When a high voltage drop across the load leads is expected the point of stabilisation can be moved from the output terminals to the load terminals by using two sense leads. Because the sense points are connected to the input of a high gain amplifier it is recommended to connect an electrolytic capacitor across the points where sense- and load-leads join. This prevents instability. Noise pick up can be reduced by twisting the sense leads together.

TEMPERATURE DERATING





The restored historical buildings where Delta Elektronika B.V. have their offices, development department and part of the production departments.



Opposite the old gate of Zierikzee.



DELTA ELEKTRONIKA BV

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