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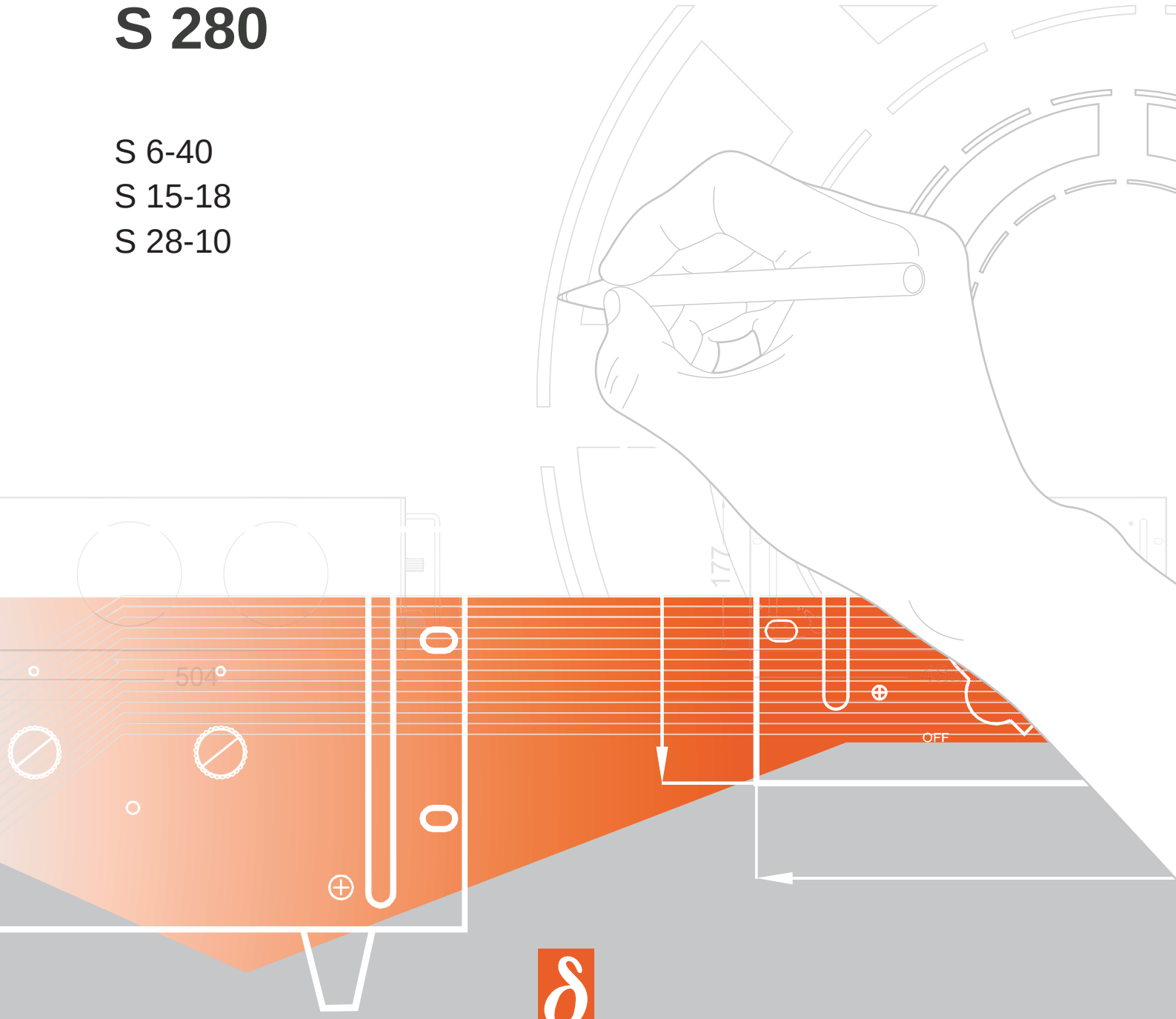
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Find the *Delta Elektronika S15-18/UL* at our website: ***Click HERE***

PRODUCT MANUAL.

S 280

S 6-40
S 15-18
S 28-10



DELTA ELEKTRONIKA
DC POWER SUPPLIES

Safety Instructions

Caution

The following safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with the safety precautions or warnings in this document violates safety standards of design, manufacture and intended use of this equipment and may impair the built-in protections within. Delta Elektronika shall not be liable for user's failure to comply with these requirements.

Installation Category

The Delta Elektronika power supplies have been evaluated to installation category II.(Over voltage category II)

Grounding

This product is a safety Class 1 instrument. To minimize shock hazard, the instrument chassis must be connected to the AC Power Supply mains through a tree or four conductor power cable for resp. a single or three phase unit, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. For instruments designed to be hard-wired to supply mains, the protective earth terminal must be connected to the safety electrical ground before another connection is made. Any interruption of the protective ground conductor, or disconnection of the protective earth terminal will cause a potential shock hazard that might cause personal injury.

Fuses

Fuses must be changed by authorized Delta Elektronika service personnel only, for continued protection against risk of fire.

Input Ratings

Do not use an AC Supply which exceeds the input voltage and frequency rating of this instrument. The input voltage and frequency rating of the Delta Elektronika power supply series are stated in de accompanying datasheet.

Live Circuits

Operating personnel must not remove the instrument cover. No internal adjustment or component replacement is allowed by non Delta Elektronika qualified personnel. Never replace components with the power cable connected. To avoid injuries, always disconnect power, discharge circuits and remove external voltage sources before touching components.

Parts Substitutions & Modifications

Parts substitutions and modifications are allowed by authorized Delta Elektronika service personnel only. For repairs or modifications the unit must be returned to a Delta Elektronika service facility.

Removal of (safety) covers

Safety cover(s) are used to cover potentially hazardous voltages.
Observe the following when removing safety cover(s):
- Switch off the unit.
- Disconnect the unit from the mains supply.
- Wait for 3 minutes to allow internal capacitors to discharge.
- Unscrew the screws and remove the cover(s).
- Always place the cover(s) back before connecting the unit to the mains supply again.

Environmental Conditions

The Delta Elektronika power supplies safety approval applies to the following operating conditions:

Indoor use
Ambient temperature : –20 to 50 °C
Maximum relative humidity : 95%, non condensing, up to 40 °C
: 75%, non condensing, up to 50 °C
Altitude: up to 2000 m
Pollution degree 2



Caution risk of electrical Shock



Instruction manual symbol. The instrument will be marked with this symbol when it is necessary for the user to refer to the instruction manual



Protective ground conductor terminal

O *Off (supply)*

I *On (Supply)*

WEEE

(Waste Electrical & Electronic Equipment)

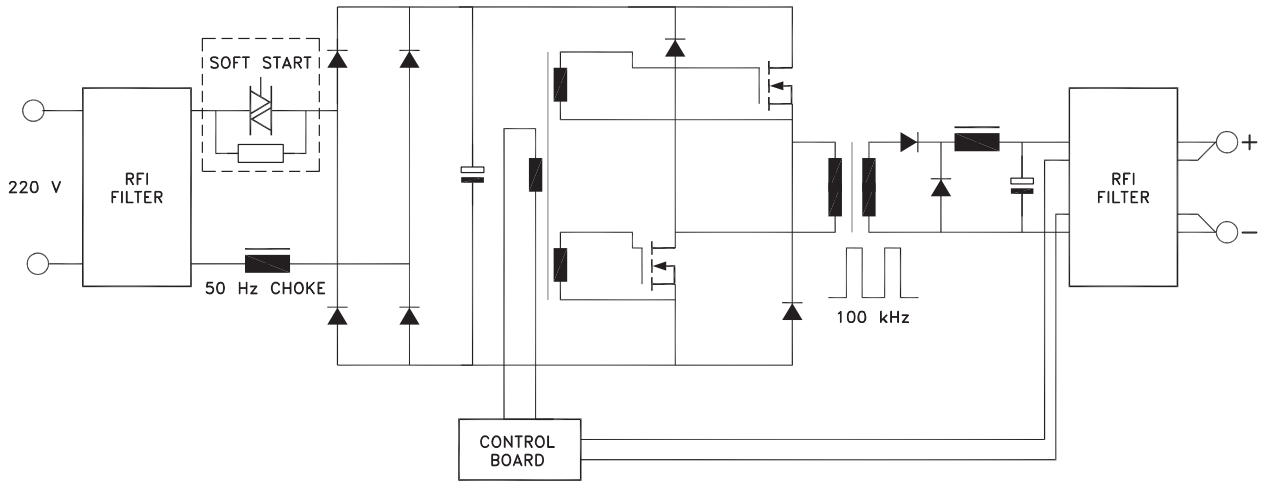
Correct Disposal of this Product

Applicable in the European Union.



This marking shown on the product, its packing or its literature indicates that it should not be disposed with other wastes at the end of its working life, but should be collected separately to recycle it responsibly to promote the sustainable reuse of material resources.

CIRCUIT DESCRIPTION



Simplified functional diagram of the S-series

The 220 V AC 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, over dimensioning 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 I kHz are compensated by the voltage regulation. However high load ripple currents which exceed the current limit or which have strong components above I 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 S28-10.

INSTALLATION

POWER REQUIREMENT

AC-input

The S-series operates on any input voltage between 195 and 265 V AC 48 and 62 Hz. 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 S28-10 may go as low as 175 V AC. The input fuse is 4 A slow blow.

For operation on line voltages between 100 and 132 V AC 48 and 62 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. However at lower output voltage the minimum DC input can be lower. Contact factory for details.

MECHANICAL

Rack mounting

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

Wall mounting

Although the unit is designed as a plug-in Euro Cassette 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.

Also available are H15 female connectors with screw connections 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 S6-40 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

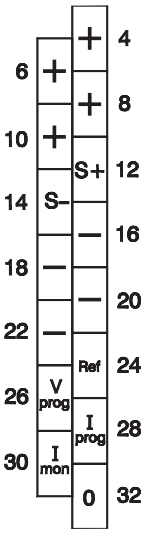
Connect 2.5 kOhm potentiometers as drawn. Turn internal potmeters to maximum. Because the 5 kOhm of the internal potmeters remains parallel to the external ones the adjustment is not linear.

External voltage and current programming

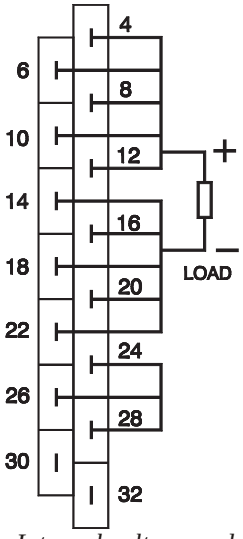
Turn internal potmeters to maximum. A programming voltage of 0-5 V gives the full range of output voltage or current. The input impedance of the programming inputs is 5 kOhm (the resistance of the internal potentiometers). The non-linearity of the programming is max. 0.15% of full range. The offset error is max. +15 mV (0.3%) for voltage and +25 mV (0.5%) for current programming.
The maximum programming speed is 600 V 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

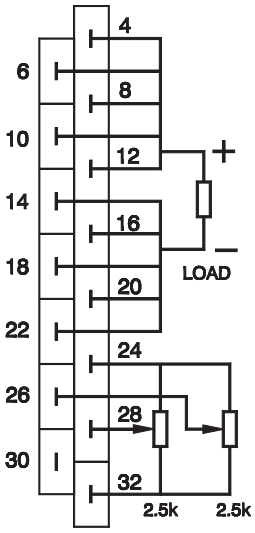
Normally the sense terminals S+ and S– will be connected directly to the + and – at the power supply output. This means that the output voltage is kept constant at the output terminals. However, if the voltage drop across the leads to the load is too high, it is possible to keep the voltage across the load constant by means of remote sensing. Max. 2 V per lead (total 4 V) 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. 20.000 uF for S 6-40, 10.000 uF for S 15-18, 4.700 uF for S 28-10



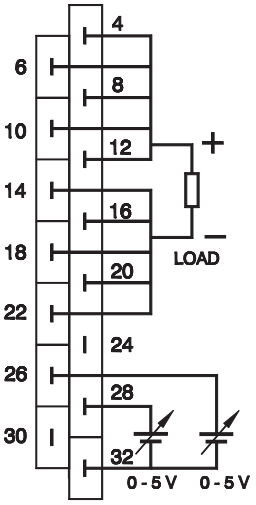
Connections at H15 connector



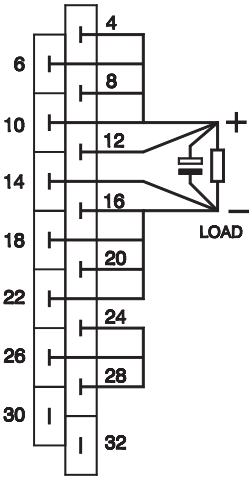
Internal voltage and current adjustment



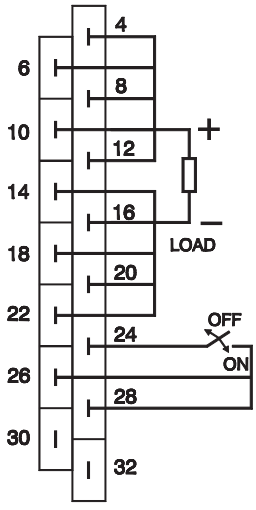
External voltage and current adjustment



Voltage and current programming by 0-5 V



Remote sensing



Remote ON / OFF

OVP adjustment

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

a.Turn the OVP adjustment to maximum.
b.Turn the output voltage to the desired OVP level (unloaded of course).
c.Slowly turn the OVP potmeter counter clockwise, just until the output voltage decreases.
d.Set output voltage to the desired value.

Parallel operation

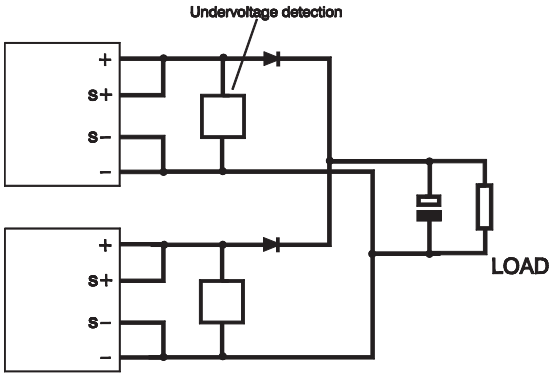
When using two or more power supplies in parallel it is recommended to keep the leads to the summing point of equal length and not to use remote sensing.
An extra electrolytic capacitor at the summing point is recommended.
Value 20.000 uF S6-40, 10.000 uF S 15-18, 4.700 uF S28-10.
The current will not 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

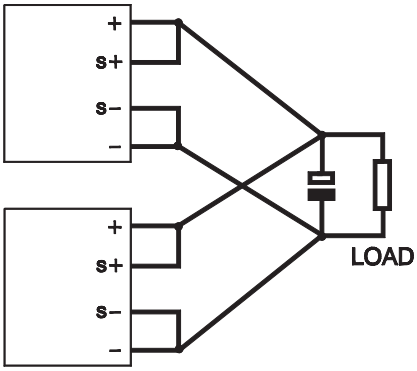
In Master / Slave parallel connection all units will share the current equally.
For Master / Slave operation connect pin 30 of the output connector of the master to pin 28 of each slave and turn the internal voltage and current potmeters of the slaves to maximum. The slaves will now follow the master when it is adjusted or programmed.
The combination will operate like one big power supply. The master can drive a maximum of 3 slaves.

Parallel connection for redundancy

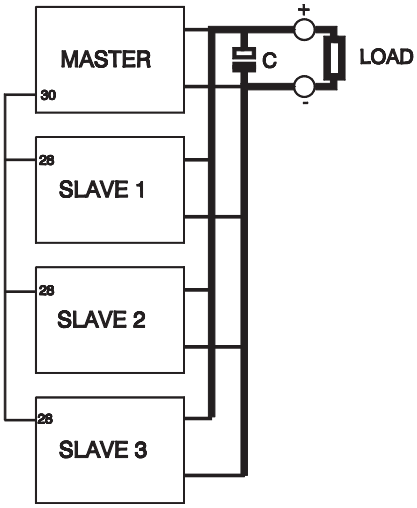
If units are connected in parallel for redundancy Master / Slave operation cannot be used because in that case each unit has to operate independently.
In order to detect whether one of the outputs fails it is necessary to separate the units with diodes. For S 28-10 a complete redundant adapter RA10 is 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.



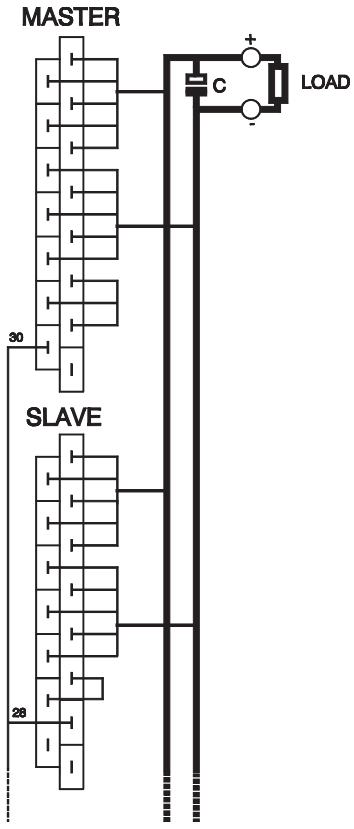
Parallel for redundancy



Parallel operation



M / S parallel operation



Connections for M / S operation

P.O. Box 27
4300 AA Zierikzee
The Netherlands

Tel. +31 111 413656
Fax. +31 111 416919
www.deltapowersupplies.com

DELTA ELEKTRONIKA B.V.

EC Declaration of Conformity

We

Delta Elektronika
P.O. BOX 27
4300 AA ZIERIKZEE
The Netherlands

Declare under sole responsibility that the following Power Supply:

S 6 - 40
S 15 - 18
S 28 - 10

Meets the intent of Directives 2004/108/EC for Electromagnetic Compatibility and Directives 2006/95/EC regarding Electrical Safety. (Low Voltage Directive)
Compliance was demonstrated to the following specification as listed in the official Journal of the European Communities:

EN 61000-6-3 Generic Emissions: (residential, light industrial)

EN 55022 Radiated and conducted, Class **B**
EN 61000-3-2 Power Harmonics
EN 61000-3-3 Voltage fluctuation and flicker

EN 61000-6-1 Generic Immunity: (residential, light industrial)

EN 61000-6-2 Generic Immunity: (industrial environment)

EN 61000-4-2 Electrostatic Discharge
EN 61000-4-3 Radiated electromagnetic fields
EN 61000-4-4 Electrical Fast Transients / Bursts
EN 61000-4-5 Surge immunity
EN 61000-4-6 RF common mode, conducted
EN 61000-4-11 Voltage variations and dips

EN 60950 Safety of IT equipment

EN 61010 Safety of electrical equipment for measurement, control and laboratory use

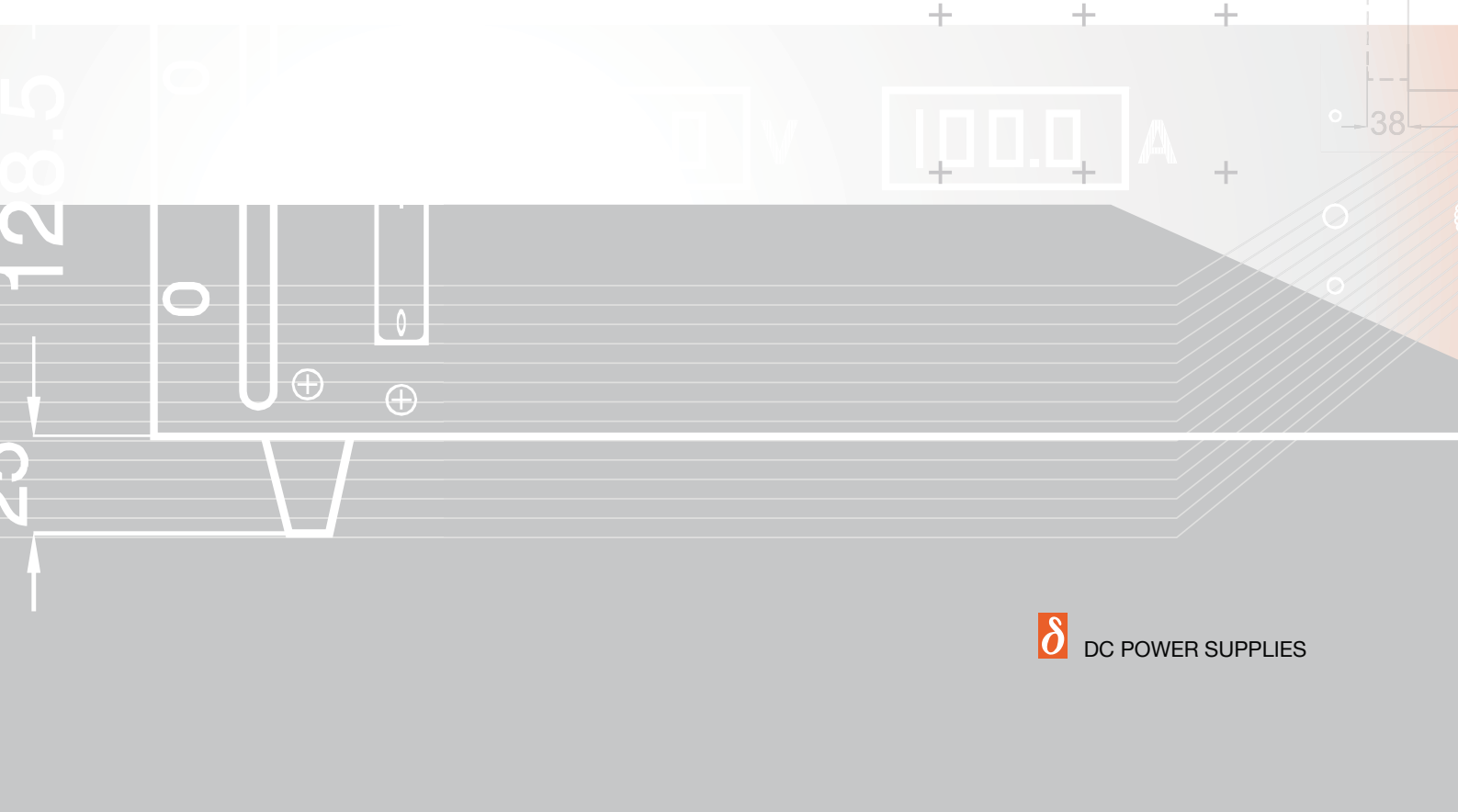
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J. Koopman,
Managing director

DELTAELEKTRONIKA B.V.

Delta Elektronika B.V.
Vissersdijk 4
4301 ND Zierikzee
The Netherlands
Tel. +31 111 413656
Fax. +31 111 416919

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