

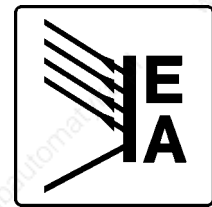
# 19" Power Supplies AC-DC and DC-DC

VERO

**Danica**  
SUPPLY



# Power Supply Systems



**EA-Elektro-Automatik**

Founded in 1974 EA-Elektro-Automatik began manufacturing power supplies for light industrial markets and laboratory/test applications. With this experience and having developed a reputation for intelligent and reliable design, in 1993 Elektro-Automatik developed a new series power supplies created specifically for the telecomms industry.

Today Elektro Automatik are regarded as one of the worlds leading suppliers of secure DC systems to the mobile communications industry. With more than 25 years experience in power, EA remain focused on developing new power conversion technologies and offering their customers an unrivalled service in both standard product and custom designed solutions.

Represented across the globe, EA-Elektro-Automatik employ more than 270 people in its modern 10,000m<sup>2</sup> production and development facility in Viersen, Germany.

Today's rapidly expanding and diversifying telecomms market demands efficient design and short production lead-times, it is through recognising and reacting to these goals that Elektro-Automatik is now the preferred supplier to the world of telecommunications.



**EA-Elektro-Automatik**



## Vero and Danica – Power Supplies

EA-Elektro-Automatik is the original equipment manufacturer of two of Europe's most respected names in power supplies; Vero and Danica Supply.

In 2000 EA created the most comprehensive range of power supplies perhaps ever available from a single manufacturer. The EA, Vero and Danica brands combine to offer our customers a variety of solutions in markets ranging from light industrial through to mobile communication.

### VERO Power Supplies

# VERO

Founded in 1976, Vero Electronics designed and manufactured power supplies primarily for pluggable 19" rack applications. From this solid grounding, Vero developed many bespoke solutions for customers across the globe.

Now part of the EA-Elektro-Automatik power supplies group, the manufacturing plant in Bremen has seen extensive investment and modernisation, creating a truly world class production facility.

### Danica Power Supplies

# Danica SUPPLY

In 2000, EA-Elektro-Automatik began the production of the Danica series of high quality telecom power supplies. The Danica brand has stood as a quality benchmark in the telecommunications market for the past 25 years. EA's manufacturing plant in Viersen has been extended significantly to cater for the ever-increasing demand for power supplies in the telecommunications market.



VERO + Danica Power Supplies

# Introduction

## EVOLUTION

In the mid-1970's new, switched mode technology, offered significant benefits in terms of power density to power over the existing linear designs then in common use. Today, power supplies have evolved to a point where high performance units range from 30 to 3000 Watts, with AC or DC input, single or multiple outputs, with power factor correction available on units from 80 wattsthe .

## RESEARCH AND DEVELOPMENT

Research and development is important to VERO + Danica brands, and extensive R & D resource is dedicated to developing new products for ever changing markets. These new products employ state-of-the-art circuit technology to ensure optimum performance.

## STANDARD OR CUSTOM

VERO + Danica offers a comprehensive range of standard power supplies. Flexible product design allows easy modification, even for relatively small quantities. VERO + Danica also design, develop and manufacture to customer requirements.

## POWER FACTOR COMPLIANCE

Power supplies featuring active power factor correction and complying fully with the requirements of EN61000-3-2 are available as standard product.

## The Manufacturing Sites

From Elektro-Automatik's state-of-the-art facilities it is in a position to service any power supply requirement with which it is currently presented.

CAD and circuit simulation systems are linked directly to drilling and routing machines, our company has taken the initiative and equipped its power supply manufacturing facilities with numerous sophisticated custom systems for test and power supply burn-in.

Each design is tested with a thermal imaging system. This allows engineers to determine the areas of the power supply that would benefit from additional or improved cooling.

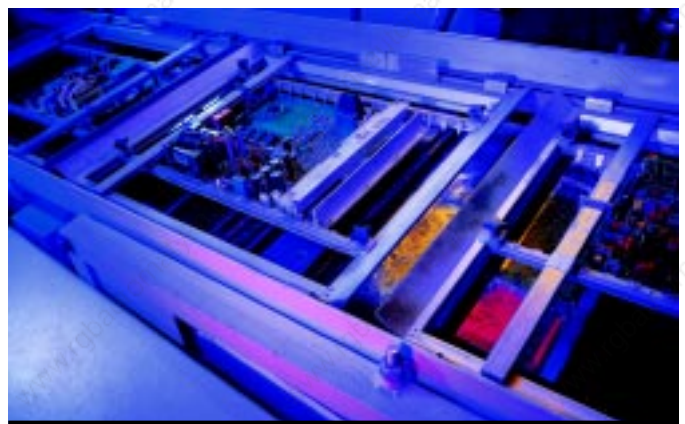
The core of the power supply final test facility, is centred around automatic functional test equipment. Here, power supplies are tested under stress and not by passive means. The high voltage, earth continuity testing and burn-in facilities are custom systems, designed in-house. All of these facilities are computer controlled and can be configured to include customer's own profiles. These systems are linked into the main product database, providing a total history of each power supply manufactured.

European legislation places responsibility on OEMs to ensure that their apparatus or equipment complies with the requirements of #83/336/EEC - the European Union EMC Directive. Elektro-Automatik has invested significant resources in ensuring that its products not only meet, but exceed, the requirements of European regulations, compliance statements are available on request.

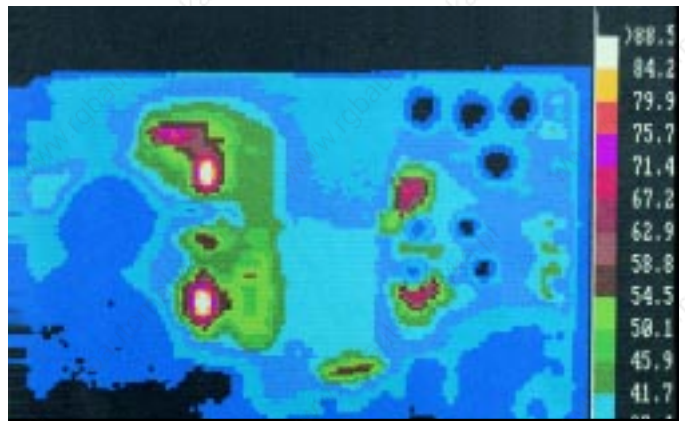
All test systems are bar-code linked to the main database. This allows total traceability at all stages of the manufacture and test procedures for total quality control.



CAD Work station



Soldering machine



Test image from thermal camera



EMC Radiation testing



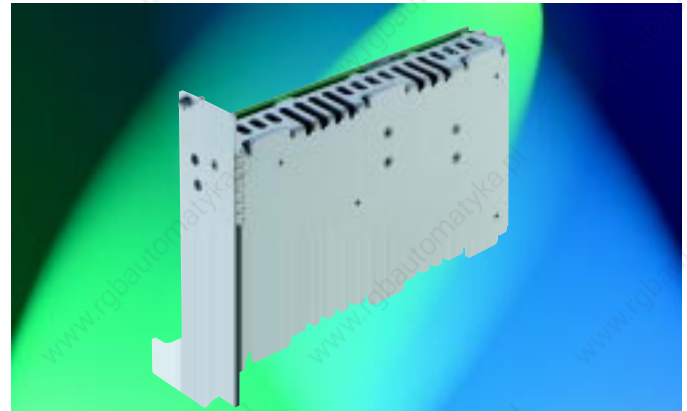
## Standard and custom products

### STANDARD POWER SUPPLIES

VERO + Danica has a number of strengths, pre eminent among which is its highly respected standard product range. This range of products maintains VERO + Danica's reputation for designing reliable, high quality products.

#### Euromodular VP80, VP150 and TPS Series

The latest units to be introduced by EA , the VP80 and VP150 feature harmonic correction over two years in advance of the date on which it becomes mandatory.



VP80-4

#### Open frame/Cased Series

A quality range of industry standard open frame/cased power supplies for use in systems. Universal input allows any system into which these power supplies are integrated to be used anywhere in the world - without physically selecting the input voltage.



Open frame Power Supplies: PO500

### CUSTOM POWER SUPPLIES

Building on the success of the established, and proven, procedures utilised in the production of the standard product lines EA design and build power supplies to suit specific customer requirements. All custom units - irrespective of the total number produced - are manufactured and tested to the same rigorous standards as our standard product, reassuring our customers that the delivered units will meet his requirements *exactly*.

#### Railway Power Supplies

EA offers a range of 19" Euromodular power supplies designed specifically for use in the rail industry. These units are ruggedised - both electrically and mechanically - to withstand harsh environmental conditions.

#### Telecom power supplies

EA has established itself as one of the leading manufacturers of bulk custom power supplies, particularly those which relate to N+1 and modular plug-in designs. As a consequence of designing and developing a number of custom battery backup systems for telecoms OEMs, EA has evolved a range of standard solutions for battery backed, secure DC telecoms systems.

EA, VERO + Danica power supplies can be found in applications from mobile telephone base stations through to air traffic control systems and railways - proving the strength of VERO + Danica's design and manufacturing capabilities in a variety of challenging environments.



19"-Module VERO TRIVOLT



Custom power supply

## Contents

| <b>ac-dc</b> |              |                 |         |          |      |
|--------------|--------------|-----------------|---------|----------|------|
| <b>AC-DC</b> |              |                 |         |          |      |
| Style        | Output power | Input Voltage   | Outputs | Series   | Page |
| 19"-Rack     | 30 Watt      | 110/230 VAC     | 1       | PK 30    | 13   |
|              |              | 110/230 VAC     | 2       | PK 30    | 17   |
|              | 50 Watt      | 110/230 VAC     | 1       | EC 50    | 23   |
|              |              | 110/230 VAC     | 3       | EC 50    | 25   |
|              |              | 110/230 VAC     | 3       | PK 60    | 13   |
|              | 60 Watt      | 110/230 VAC     | 1       | PK 60    | 17   |
|              |              | 110/230 VAC     | 2       | PK 60    | 17   |
|              |              | 110/230 VAC     | 3       | PK 60    | 19   |
|              | 80 Watt      | 110-230 VAC PFC | 1       | VP80     | 8    |
|              |              | 110-230 VAC PFC | 2       | VP80     | 8    |
|              |              | 110-230 VAC PFC | 3       | VP80     | 8    |
|              |              | 110-230 VAC PFC | 4       | VP80     | 8    |
|              | 100 Watt     | 110-230 VAC     | 1       | TPS 3102 | 32   |
|              |              | 110/230 VAC     | 3       | TPS 3102 | 32   |
|              | 120 Watt     | 110/230 VAC     | 1       | PK120    | 13   |
|              |              | 110/230 VAC     | 3       | PK120    | 19   |
|              | 125 Watt     | 110/230 VAC     | 3       | EC 125   | 25   |
|              | 150 Watt     | 110-230 VAC     | 1       | TPS 3152 | 32   |
|              |              | 110-230 VAC     | 3       | TPS 3152 | 32   |
|              |              | 110-230 VAC PFC | 3       | VP 150   | 8    |
|              | 240 Watt     | 110/230 VAC     | 1       | PK 240   | 13   |
|              |              | 110/230 VAC     | 3       | PK 240   | 19   |
|              | 550 Watt     | 93-264 VAC PFC  | 1       | TPS 4000 | 34   |
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\* Power supplies with wide range input can be used as DC-DC converter, consult the sales office.

| <b>dc-dc</b>           |              |                     |         |         |      |
|------------------------|--------------|---------------------|---------|---------|------|
| <b>DC-DC CONVERTER</b> |              |                     |         |         |      |
| Style                  | Output Power | Rated Input Voltage | Outputs | Series  | Page |
| 19"-Rack               | 30 Watt      | 12/24/48VDC         | 1       | GK 30   | 42   |
|                        |              | 12/24/48VDC         | 2       | GK 30   | 45   |
|                        | 60 Watt      | 24/48 VDC           | 1       | GK 60   | 42   |
|                        |              | 12/24/48VDC         | 2       | GK 60   | 45   |
|                        |              | 12/24/48VDC         | 3       | GK 60   | 47   |
|                        | 100 Watt     | 24/48VDC            | 1       | TPS 133 | 39   |
|                        | 120 Watt     | 24/48VDC            | 1       | GK 120  | 42   |
|                        |              | 24/48VDC            | 3       | GK 120  | 47   |
|                        | 125 Watt     | 24/48VDC            | 3       | TPS 264 | 39   |
|                        | 150 Watt     | 24/48VDC            | 1       | TPS 233 | 39   |
|                        | 250 Watt     | 12/24/48/110VDC     | 1       | TPS 168 | 39   |

## AC-DC Power Supplies

- VP-Series
- PK-Series
- EC-Series
- TPS-Series

ac-dc

ac-dc

ac-dc

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AC-DC

## AC-DC power supplies



### VP Series, Power Supplies with active PFC

The latest 19" plug-in power supplies from VERO + Danica are designed to meet the requirements of EN61000-3-2 incorporating active PFC (Power Factor Correction). Active PFC allows a power factor of  $\gg 1$  so the waveform exactly matches the shape of the mains voltage wave.

### 19" - Power Supply Modules

A wide range of rectifier chargers are available to form the core of a reliable secure DC system. Hot-swap, N+1, remote sense and active power sharing features are available on these standard modules.

### COST-OPTIMISED POWER SUPPLIES

The EC range is a family of cost-optimised power supplies with power outputs ranging from 50 to 125 Watt and single, dual or triple outputs.

### OPEN FRAME/CASED POWER SUPPLIES

EA has a wide range of competitive open frame converters with power ranging from 40 to 500 Watts and 1 to 3 outputs for computer and datacommunications applications.



## VP - Series, Power Supplies with PFC



VP 80  
VP 150

**AC-DC**

# VP 80/150 Series: 1-4 outputs, active PFC

Primary switched mode plug-in power supply with power factor correction for 19" applications in accordance with DIN 41494

### Features

- Active Power Factor Correction (PF»1)
- Wide 94 - 253VAC input range without modification
- Direct plug-up into backplanes
- Compact design
- **Power share, V1, V2 and multiple output units**
- CE compliant EMC and LV Directives
- EMC Design (IEEE 1101.10 front panel)
- Safety in accordance with EN60950, UL, cUL

The latest units to be introduced by EA , the VP80 and VP150 feature harmonic correction.

The single converter technology employed in the VP Series allows load sharing on multiple outputs. In addition, the power density has increased by more than 30%, enabling the units to supply 80 watts from a cassette measuring only 3U x 7HP (160mm deep).

All units of the VP-Series carry the CE mark according to the relevant standards and are cUL listed.

### EA VP-Series at the heart of a system

The mechanical design of the power supply allows for operation in systems with integrated backplanes, permitting the power supply to be plugged directly into the board. The physical width of the cassette complies with the 4HP grid used in standard backplane layout, so the 80 Watt version fits into an 8HP wide space. This means that the power supply is only 2 slots wide (guide positions 1 or 2 are possible).

There is no heatsink on the rear, so the units can be plugged directly to the backplane.

### New: N+1 redundant variants VP 80-1R

### Ordering information

| Description: Mating connectors          | Order code       |
|---|------------------|
| Mating connector coded H15 to DIN 41612 | <b>17-10115K</b> |
| Coding keys (pkt 10)                    | <b>17-10064F</b> |

### Ordering information

**Description:** VP80-Series: 3U x 7HP / VP150 Series: 3U x 12HP

| Type         | Outputs                           |
|--------------|-----------------------------------|
| VP80-1-R 5V  | 5V/16A                            |
| VP80-1-R 12V | 12V/6,7A                          |
| VP80-1-R 15V | 15V/5,3A                          |
| VP80-1-R 24V | 24V/3,3A                          |
| VP80-1 5V    | +5V/16A                           |
| VP80-1 12V   | +12V/6,7A                         |
| VP80-1 15V   | +15V/5,3A                         |
| VP80-1 24V   | +24V/3,3A                         |
| VP80-2A      | +12V/5A; -12V/2A                  |
| VP80-2B      | +15V/4A; -15V/2A                  |
| VP80-2C      | +5V/12A; +12V/2A                  |
| VP80-2D      | +5V/5A; +24V/2,5A                 |
| VP80-2E      | +12V/2A; +24V/2,5A                |
| VP80-3A      | 5V/12A; ±12V/1A                   |
| VP80-3B      | 5V/12A; ±15V/1A                   |
| VP80-3C      | 5V/12A; +12V/4A; -12V/1A          |
| VP80-3D      | 5V/12A; +15V/3A; -15V/1A          |
| VP80-4       | 3,3V/3A; 5V/12A; +12V/4A; -12V/1A |
| VP150-3      | 5V/18A; +12V/5A; -12V/2A          |



VP Series

### Technical Data VP Series

| Input specification  |   |
|--|---|
| Input voltage:   | 94-253VAC   |
| Input frequency:   | 47-63Hz   |
| Inrush surge current limit:                                      | <27A (NTC)  |
| Input overvoltage protection:                                    | VDR   |
| Hold up time (Nominal V <sub>IN</sub> ; 100% I <sub>OUT</sub> ): | >20ms   |
| Power Factor:  | >0,97   |
| Efficiency:  | typ. 75%  |
| Safety (Compliant with Low Voltage Directive 73/23/EEC)          |   |
| Safety standards:  | EN60950, IEC 950, UL1950, cUL   |
| EMC (Compliant with EMC Directive 89/336/EEC)                    |   |
| Emmissions:  | EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz)                                  |
| Immunity:  | EN 50082-2  |
| Electro Static Discharge:  | EN 61000-4-2  |
| Electrical fast transients/Burst:                                | EN 61000-4-4  |
| RF Conducted disturbance:  | EN 50141  |
| RF Field susceptibility:   | EN 50140  |
| Surge susceptibility:  | EN 61000-4-5  |
| Harmonic distortion:   | EN 61000-3-2  |
| Environmental  |   |
| Operating temperature:   | 0°C to +70°C  |
| Storage temperature:   | -25°C to +85°C  |
| Derating:  | 2W/°C above 45°C natural convection<br>4W/°C above 60°C forced air cooling (1m/s) |
| Relative Humidity:   | max. 90% non-condensing   |
| Temperature coefficient:   | <0,05%/°C   |
| Physical   |   |
| Case material / finish:  | Steel and aluminium cassette  |

| Order-Code          | Order-Code           |
|---------------------|----------------------|
| Without front panel | Front panel 8HP Std. |
| 116-020043E         | 116-020047D          |
| 116-020044B         | 116-020048A          |
| 116-020045K         | 116-020049J          |
| 116-020046G         | 116-020050K          |
| 116-020006A         | 116-020015L          |
| 116-020007J         | 116-020016H          |
| 116-020008F         | 116-020017E          |
| 116-020009C         | 116-020018B          |
| 116-020010D         | 116-020019K          |
| 116-020011A         | 116-020020L          |
| 116-020012J         | 116-020021H          |
| 116-020013F         | 116-020022E          |
| 116-020014C         | 116-020023B          |
| 116-020000H         | 116-020024K          |
| 116-020001E         | 116-020025G          |
| 116-020002B         | 116-020026D          |
| 116-020003K         | 116-020027A          |
| 116-020004G         | 116-020028J          |
| -                   | 116-031530B          |

# VP Series: 1-4 outputs, active PFC

## Output specification

| VP80-1   | V1  | V1          | V1          | V1          |
|--|---|-------------|-------------|-------------|
| Output voltage:  | <b>5V</b>   | <b>12V</b>  | <b>15V</b>  | <b>24V</b>  |
| Output adjustment range:   | 4,8-5,5V  | 11-13V      | 14-16V      | 22-26V      |
| Output current:1)  | <b>16A</b>  | <b>6,7A</b> | <b>5,3A</b> | <b>3,3A</b> |
| Ripple:  | <40mV <sub>pp</sub>   |             |             |             |
| Current limit:   | >16,1A  | >6,75A      | >5,35A      | >3,35A      |
| Short circuit protection:  | electronic, automatic restart   |             |             |             |
| Overvoltage protection (OVP):  | 6-6,7V  | 15,5-18V    | 17-21V      | 27-32V      |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :           | <4,8V   | <11,5V      | <14,4V      | <23V        |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,2%   |             |             |             |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,2%   |             |             |             |
| Transient response (10...90% I <sub>OUT</sub> ):                         | <1ms  |             |             |             |
| Voltage compensation with SENSE max.:                                    | 0,5V  |             |             |             |
| Derating:  | 2W/°C above 45°C - natural convection, 4W/°C above 60°C - forced air cooling (1m/s) |             |             |             |

| VP80-2   | Version A   |             | Version B   |             | Version C  |             |
|--|---|-------------|-------------|-------------|------------|-------------|
|  | V1  | V2          | V1          | V2          | V1         | V2          |
| Output voltage:  | <b>+12V</b>   | <b>-12V</b> | <b>+15V</b> | <b>-15V</b> | <b>+5V</b> | <b>+12V</b> |
| Output adjustment range:   | fixed   | fixed       | fixed       | fixed       | 4,8-5,5V   | fixed       |
| Output current:1)  | <b>5A</b>   | <b>2A</b>   | <b>4A</b>   | <b>2A</b>   | <b>12A</b> | <b>2A</b>   |
| Ripple:  | <40mV <sub>pp</sub>   |             |             |             |            |             |
| Current limit:   | >5,1A   | >2,1A       | >4,1A       | >2,1A       | >12,1A     | >2,1A       |
| Short circuit protection:  | electronic, automatic restart   |             |             |             |            |             |
| Overvoltage protection (OVP):  | —   | —           | —           | —           | 6-6,7V     | —           |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | —   | —           | —           | —           | <4,8V      | —           |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,2%   |             |             |             |            |             |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,5%   | <1,5%2)     | <0,5%       | <1,5%2)     | <0,5%      | <±4%2)      |
| Transient response (10...90% I <sub>OUT</sub> ):                         | <1ms  |             |             |             |            |             |
| Voltage compensation with SENSE max.:                                    | —   | —           | —           | —           | 0,5V       | —           |
| Derating:  | 2W/°C above 45°C - natural convection, 4W/°C above 60°C - forced air cooling (1m/s) |             |             |             |            |             |

| VP80-2   | Version D   |             | Version E   |             |
|--|---|-------------|-------------|-------------|
|  | V1  | V2          | V1          | V2          |
| Output voltage:  | <b>+5V</b>  | <b>+24V</b> | <b>+12V</b> | <b>+24V</b> |
| Output current adjustment:   | fixed   | 22-26V      | fixed       | 22-26V      |
| Output current:1)  | <b>5A</b>   | <b>2,5A</b> | <b>2A</b>   | <b>2,5A</b> |
| Ripple:  | <40mV <sub>pp</sub>   |             |             |             |
| Current limit:   | >5,1A   | >2,5A       | >2,1A       | >2,5A       |
| Short circuit protection:  | electronic, automatic restart   |             |             |             |
| Overvoltage protection (OVP):  | 6-6,7V  | —           | —           | —           |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | >4,8V   | —           | —           | —           |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,2%   |             |             |             |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,5%   | <1,5%2)     | <0,5%       | <1,5%2)     |
| Transient response (10...90% I <sub>OUT</sub> ):                         | <1ms  |             |             |             |
| Voltage compensation with SENSE max.:                                    | 0,5V  | —           | —           | —           |
| Derating:  | 2W/°C above 45°C - natural convection, 4W/°C above 60°C - forced air cooling (1m/s) |             |             |             |

1) Maximum output power: 80 Watt, see derating  
 2) P<sub>OUT</sub> V1 min. 5 Watt



# VP Series: 1-4 outputs, active PFC

## Output specification

| VP80-3   | Version A   |                     | Version B           |                     |
|--|---|---------------------|---------------------|---------------------|
|  | V1  | V2/V3               | V1                  | V2/V3               |
| Output voltage:  | <b>5V</b>   | <b>±12V</b>         | <b>5V</b>           | <b>±15V</b>         |
| Output voltage adjustment:   | 4,8-5,5V  | fixed               | 4,8-5,5V            | fixed               |
| Output current:1)  | <b>12A</b>  | <b>1A</b>           | <b>12A</b>          | <b>1A</b>           |
| Ripple:  | <40mV <sub>PP</sub>   | <10mV <sub>PP</sub> | <40mV <sub>PP</sub> | <10mV <sub>PP</sub> |
| Current limit:   | >12,1A  | >1,01A              | >12,1A              | >1,01A              |
| Short circuit protection:  | electronic, automatic restart   |                     |                     |                     |
| Overvoltage protection (OVP):  | 6-6,7V  | —                   | 6-6,7V              | —                   |
| Powerfail Signal (full load) >6ms before V <sub>OUT</sub> :              | <4,8V   | —                   | <4,8V               | —                   |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub>            |   |                     | <0,2%               |                     |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub> | <0,5%   | <1,5%2)             | <0,5%               | <1,5%2)             |
| Transient response (10...90% I <sub>OUT</sub> ):                         | <1ms  |                     |                     |                     |
| Voltage compensation with SENSE max.:                                    | 0,5V  | —                   | 0,5V                | —                   |
| Derating:  | 2W/°C above 45°C - natural convection, 4W/°C above 60°C - forced air cooling (1m/s) |                     |                     |                     |

| VP80-3   | Version C   |                     |                     | Version D           |                     |                     |
|--|---|---------------------|---------------------|---------------------|---------------------|---------------------|
|  | V1  | V2                  | V3                  | V1                  | V2                  | V3                  |
| Output voltage:  | <b>5V</b>   | <b>+12V</b>         | <b>-12V</b>         | <b>5V</b>           | <b>+15V</b>         | <b>-15V</b>         |
| Output voltage adjustment:   | 4,8-5,5V  | fixed               | fixed               | 4,8-5,5V            | fixed               | fixed               |
| Output current:1)  | <b>12A</b>  | <b>4A</b>           | <b>1A</b>           | <b>12A</b>          | <b>3A</b>           | <b>1A</b>           |
| Ripple:  | <40mV <sub>PP</sub>   | <40mV <sub>PP</sub> | <10mV <sub>PP</sub> | <40mV <sub>PP</sub> | <40mV <sub>PP</sub> | <10mV <sub>PP</sub> |
| Current limit:   | >12,1A  | >4,1A               | >1,01A              | >12,1A              | >3,1A               | >1,01A              |
| Short circuit protection:  | electronic, automatic restart   |                     |                     |                     |                     |                     |
| Overvoltage protection (OVP):  | 6-6,7V  | —                   | —                   | 6-6,7V              | —                   | —                   |
| Powerfail Signal (full load) >6ms before V <sub>OUT</sub> :              | <4,8V   | —                   | —                   | <4,8V               | —                   | —                   |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub>            |   |                     |                     | <0,2%               |                     |                     |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub> | <1%   | <±4%2)              | <1,5%2)             | <1%                 | <±4%2)              | <1,5%2)             |
| Transient response (10...90% I <sub>OUT</sub> ):                         | <1ms  |                     |                     |                     |                     |                     |
| Derating:  | 2W/°C above 45°C - natural convection, 4W/°C above 60°C - forced air cooling (1m/s) |                     |                     |                     |                     |                     |

| VP80-4   | V1  | V2                  | V3                  | V4                  |
|--|---|---------------------|---------------------|---------------------|
|  | Output voltage:   | <b>+3,3V</b>        | <b>+5V</b>          | <b>+12V</b>         |
| Output voltage adjustment:   | fixed   | 4,8-5,5V            | fixed               | fixed               |
| Output current:1)  | <b>3,0A</b>   | <b>12A</b>          | <b>4A</b>           | <b>1A</b>           |
| Ripple:  | <20mV <sub>PP</sub>   | <40mV <sub>PP</sub> | <40mV <sub>PP</sub> | <10mV <sub>PP</sub> |
| Current limit:   | >3,01A  | >12,1A              | >4,1A               | >1,01A              |
| Short circuit protection:  | electronic, automatic restart   |                     |                     |                     |
| Overvoltage protection (OVP):  | —   | 6-6,7V              | —                   | —                   |
| Powerfail Signal (full load) >6ms before V <sub>OUT</sub> :              | —   | <4,8V               | —                   | —                   |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub>            |   |                     | <0,2%               |                     |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub> | <±4%  | <1%                 | <1,5%3)             | <1,5%3)             |
| Transient response (10...90% I <sub>OUT</sub> ):                         | <1ms  |                     |                     |                     |
| Derating:  | 2W/°C above 45°C - natural convection, 4W/°C above 60°C - forced air cooling (1m/s) |                     |                     |                     |

1) Maximum output current: 80 Watt, see derating

2) I<sub>OUT</sub> V1 min. 1A

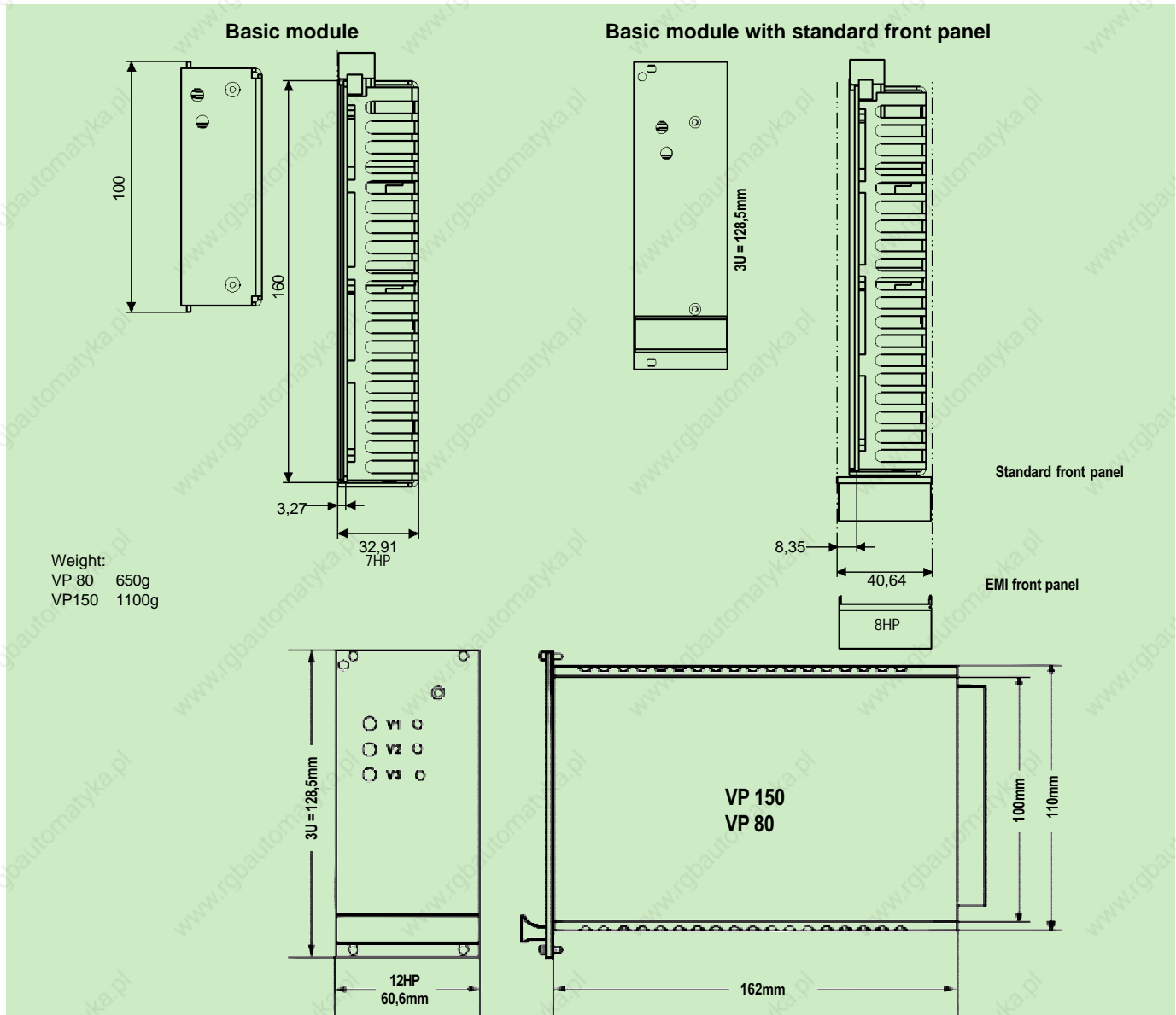
3) I<sub>OUT</sub> V2 min. 1A

| VP150-3  | V1   | V2                  | V3                  |
|--|--|---------------------|---------------------|
|  | Output voltage:  | <b>+5V</b>          | <b>+12V</b>         |
| Output voltage adjustment:   | 4,5...5,5V   | 11,8...15,2V        | -11,8...-15,2V      |
| Output current:1)  | <b>20A</b>   | <b>4A</b>           | <b>2A</b>           |
| Ripple:  | <40mV <sub>PP</sub>  | <20mV <sub>PP</sub> | <20mV <sub>PP</sub> |
| Current limit:   | >20,5A   | >25A                | >2,7A               |
| Short circuit protection:  | electronic, automatic restart  |                     |                     |
| Overvoltage protection (OVP):  | 6 - 6,7V   | 16 - 18V            | -16 - 18V           |
| Powerfail Signal (full load) >5ms before V <sub>OUT</sub> :              | >4,8V  | —                   | —                   |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub>            | >0,2%  |                     |                     |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub> | <0,2%  | <0,2%               | <0,2%               |
| Transient response (10...90% I <sub>OUT</sub> ):                         | <1ms   |                     |                     |
| Derating:  | 4W/°C ab 45°C -above 45°C - natural convection, 8W/°C above 60°C - forced air cooling (1m/s) |                     |                     |

1) Maximum output power: 150 Watt, see derating

# VP Series: 1-4 outputs, active PFC

## Mechanical details



### Connector pin allocation H15 DIN41612

| PIN | Function | VP80-1   | VP80-2 | VP80-3 | VP80-4   | VP150    |          |
|-----|----------|----------|--------|--------|----------|----------|----------|
|     |          | A+B      | C+E    | D      | A+B      | C+D      |          |
| 4   | +V1      | —        | +V1    | +V1    | +V1      | +V1      | +5V      |
| 6   | +V1      | —        | +V1    | +V1    | +V1      | +V1      | +5V      |
| 8   | GNDV1    | —        | GNDV1  | GNDV1  | GND      | GNDV1/V2 | GND1     |
| 10  | GNDV1    | —        | GNDV1  | GNDV1  | GNDV1    | GND      | GND1     |
| 12  | +SENSE   | —        | +SENSE | —      | +SENSE   | +SENSE   | +S       |
| 14  | -SENSE   | —        | -SENSE | —      | -SENSE   | -SENSE   | -S       |
| 16  | FF       | —        | FF     | —      | FF       | FF       | FF       |
| 18  | —        | +V1      | —      | —      | +V2      | +V2      | +12V     |
| 20  | —        | GNDV1/V2 | +V2    | +V2    | GNDV2/V3 | GND      | GND2     |
| 22  | —        | -V2      | GNDV2  | GNDV2  | -V3      | -V3      | -12V     |
| 24  | —        | —        | —      | —      | —        | —        | ext. Off |
| 26  | —        | —        | —      | —      | —        | —        | —        |
| 28  | N        | N        | N      | N      | N        | N        | N        |
| 30  | L        | L        | L      | L      | L        | L        | L        |
| 32  | PE       | PE       | PE     | PE     | PE       | PE       | PE       |



Note: Sense lines must be connected. For maximum compensation for supply lead voltage drop they should be connected as close to the load as possible

## 19"- Power Supplies PK-Series

AC-DC



- PK30
- PK60
- PK60-R
- PK120
- PK125
- PK250



# PK-Series: MONOVOLT

Primary switched mode power supplies for use in 19" subracks to DIN41494, 30 to 240 Watt output power.

## Features

- Compact, rugged design
- high regulation accuracy
- Safety to approvals UL, cUL and EN60950
- CE marked for compliance to EMC and Low Voltage Directives
- SENSE operation
- Overvoltage protection (OVP)
- Powerfail signal
- Remote On/Off
- Short circuit and no load protected
- Coded H15 connector
- Standardized pinning



PK-Series MONOVOLT Power Supplies

## Ordering information

### Description:

| PK Series Power Supplies 30W Output power |           |                   | Order-Code     |
|---|-----------|-------------------|----------------|
| Type                                      | Output    | without Powerfail | with Powerfail |
| PK30 3Ux8HP                               | 5V/6A     | 116-010016D*      | -              |
| PK30 3Ux8HP                               | 12-15V/2A | 116-010215H       | -              |
| PK30 3Ux8HP                               | 24V/1,5A  | 116-010216E       | -              |

### Description: PK Series; 60Watt Output power

|               |          |              |              |
|---------------|----------|--------------|--------------|
| PK60 3Ux8HP   | 3,3V/15A | 116-010196L  | -            |
| PK60 3Ux8HP   | 5V/12A   | 116-010063D* | 116-010074H* |
| PK60 3Ux8HP   | 12V/5A   | 116-010064A* | -            |
| PK60 3Ux8HP   | 15V/4A   | 116-010065J* | -            |
| PK60 3Ux8HP   | 24V/2,5A | 116-010066F* | 116-010077K* |
| PK60-R 3Ux8HP | 5V/12A   | 116-010128L# | -            |
| PK60-R 3Ux8HP | 12V/5A   | 116-010219G# | -            |
| PK60-R 3Ux8HP | 15V/4A   | 116-010220H# | -            |
| PK60-R 3Ux8HP | 24V/2,5A | 116-010129H# | -            |

### Description: PK Series; 120Watt Output power

|               |         |             |             |
|---------------|---------|-------------|-------------|
| PK120 3Ux14HP | 5V/20A  | 116-010069H | 116-010081B |
| PK120 3Ux14HP | 12V/10A | 116-010070J | 116-010082K |
| PK120 3Ux14HP | 15V/8A  | 116-010071F | -           |
| PK120 3Ux14HP | 24V/5A  | 116-010072C | 116-010084D |

### Description: PK Series; 240Watt Output power

|               |         |   |             |
|---------------|---------|---|-------------|
| PK240 3Ux24HP | 5V/45A  | - | 116-010163K |
| PK240 6Ux14HP | 5V/45A  | - | 116-010125J |
| PK240 3Ux24HP | 12V/20A | - | 116-010164G |
| PK240 6Ux14HP | 12V/20A | - | 116-010126F |
| PK240 3Ux24HP | 24V/10A | - | 116-010165D |
| PK240 6Ux14HP | 24V/10A | - | 116-010127C |

### Accessories:

|  |             |
|--|-------------|
| Reduced height front panel: PK30                   | 148-010012F |
| Reduced height front panel: PK60                   | 148-010021E |
| Reduced height front panel: PK120                  | 148-010019G |
| Mating connector coded H15 to DIN 41612            | 017-010115K |
| Coding keys (pkt10)                                | 017-010064F |
| Mating connector coded DIN 41612, H15+2HA/L Faston | 017-010138K |

For applications ruled under EN 61000-3-2, we recommend the use of the **VP80** series.

## Technical Data PK Series: Monovolt

### Input specification

|  |                                   |
|--|-----------------------------------|
| Input voltage (switchable):                        | 115/230VAC                        |
| Input frequency:                                   | 47-63Hz                           |
| Inrush surge current limitation:                   | by NTC resistor m20A (cold start) |
| Input overvoltage protection:                      | by VDR                            |
| Hold up time (Nominal $V_{IN}$ ; 100% $I_{OUT}$ ): | >20ms                             |
| Efficiency:  | typ. >80%                         |

### Safety (Compliant with Low Voltage Directive 73/23/EEC)

|  |                 |
|--|-----------------|
| Certified to, or meets the requirement of: | EN60950, UL1950 |
|--|-----------------|

### EMC (Compliant with EMC Directive 89/336/EEC)

|                                   |  |
|-----------------------------------|--|
| Emmissions:                       | EN 55022/B (0,15-30Mhz); EN 55022/B (30-1000MHz) |
| Immunity:                         | EN 50082-2                                       |
| Electro Static Discharge:         | EN 61000-4-2                                     |
| Electrical fast transients/Burst: | EN 61000-4-4                                     |
| RF Conducted disturbance:         | EN 50141   |
| RF Field susceptibility:          | EN 50140   |

### Environmental

|                        |                         |
|------------------------|-------------------------|
| Operating temperature: | 0°C to +70°C            |
| Storage temperature:   | -25°C to +85°C          |
| Relative humidity:     | Non-condensing 5% - 95% |

### Physical

|                       |   |
|-----------------------|---|
| Case material/finish: | Clear anodised, ventilated aluminium cassette with cooling cutouts and front or rear heat sinks as required.<br>DIN 41494 part 5 compatible |
|-----------------------|---|

\* EN60950 and UL certified

# EN60950 and cUL certified

AC-DC

# PK Series: MONOVOLT

## Output specification

| PK30   | V1                  | V1                            | V1                  |
|--|---------------------|-------------------------------|---------------------|
| Output voltage:  | <b>5V</b>           | <b>12V</b>                    | <b>24V</b>          |
| Output adjustment range:   | 4,8-5,5V            | 12-15V                        | 22-26V              |
| Output current:  | <b>0-6A</b>         | <b>0-2,5A</b>                 | <b>0-1,5A</b>       |
| Ripple:  | <40mV <sub>PP</sub> | <20mV <sub>PP</sub>           | <20mV <sub>PP</sub> |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,2%               | <0,02%                        | <0,02%              |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,2%               | <0,5%                         | <0,5%               |
| Transient response (10...90% I <sub>OUT</sub> ):                         |                     | 1ms                           |                     |
| Switching frequency, converter type:                                     |                     | 20-50kHz fly back converter   |                     |
| Current limit:   | >6,5A               | >2,6A                         | >1,5A               |
| Short circuit protection:  |                     | continuous, automatic restart |                     |
| Overvoltage protection (OVP):  | 6-6,7V              | -                             | -                   |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :           |                     | -                             | -                   |
| Temperature-coefficient/°C:  |                     | 0,02%                         |                     |
| Voltage compensation with SENSE max. NOTE 1:                             |                     | 0,5V                          |                     |
| Derating:  |                     | 1W/°C above 55°C              |                     |

| PK60   | V1           | V1           | V1                            | V1          | V1            |
|--|--------------|--------------|-------------------------------|-------------|---------------|
| Output voltage:  | <b>3,3V</b>  | <b>5V</b>    | <b>12V</b>                    | <b>15V</b>  | <b>24V</b>    |
| Output adjustment range:   | 1,8-3,5V     | 4,5-5,5V     | 11-13V                        | 13,5-16,5V  | 22-26V        |
| Output current:  | <b>0-15A</b> | <b>0-12A</b> | <b>0-5A</b>                   | <b>0-4A</b> | <b>0-2,5A</b> |
| Ripple:  |              |              | <40mV <sub>PP</sub>           |             |               |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,3%        | <0,3%        | <0,2%                         | <0,2%       | <0,2%         |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> |              |              | <0,2%                         |             |               |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 1ms          | 0,8ms        | 0,5ms                         | 0,5ms       | 0,5ms         |
| Switching frequency, converter type:                                     |              |              | 100kHz forward converter      |             |               |
| Current limit:   | >15,5A       | >12,5A       | >5,3A                         | >4,3A       | >2,7A         |
| Short circuit protection:  |              |              | continuous, automatic restart |             |               |
| Overvoltage protection (OVP):  | 2,8-5,0V     | 5,5-6,0V     | 13,2-15,0V                    | 16,5-18,0V  | 26,4-30,0V    |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :           |              | -            | -                             |             |               |
| Temperature-coefficient/°C:  |              |              | 0,02%                         |             |               |
| Voltage compensation with SENSE max. NOTE 1:                             |              |              | 0,5V                          |             |               |
| Derating:  |              |              | 1,6W/°C above 45°C            |             |               |

| PK60-Redundant   | V1   | V1            | V1                            | V1            |
|--|--|---------------|-------------------------------|---------------|
| Output voltage: (fixed):   | <b>5V±1%</b>   | <b>12V±1%</b> | <b>15V±1%</b>                 | <b>24V±1%</b> |
| Output current:  | <b>0-12A</b>   | <b>0-5A</b>   | <b>0-4A</b>                   | <b>0-2,5A</b> |
| Ripple:  |  |               | <40mV <sub>PP</sub>           |               |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |  |               | <0,2%                         |               |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> |  |               | <0,2%                         |               |
| Transient response (10...90% I <sub>OUT</sub> ):                         |  |               | 1ms                           |               |
| Switching frequency, converter type:                                     |  |               | 100kHz forward converter      |               |
| Current limit:   | >12,5A   | >5,3A         | >4,3A                         | >2,7A         |
| Short circuit protection:  |  |               | continuous, automatic restart |               |
| Overvoltage protection (OVP):  | 6,0-6,7V   | 13,2-15,0V    | 16,5-18,0V                    | 27,0-29,0V    |
| Temperature-coefficient/°C:  |  |               | 0,02%                         |               |
| Current sharing at redundant use with ASF signal:                        | >2,4A  | >1,0A         | >0,8A                         | >0,5A         |
| Voltage compensation with SENSE max. NOTE 1:                             |  |               | 0,5V                          |               |
| DC-FAIL signal:  | Active low when unit fails (NPN-open collector signal; 20mA; I <sub>0,4A</sub> ) |               |                               |               |
| Derating:  |  |               | 2W/°C above 55°C              |               |

AC-DC

# PK Series: MONOVOLT

## Output specification

| PK120  | V1           | V1                            | V1                  | V1          |
|--|--------------|-------------------------------|---------------------|-------------|
| Output voltage:  | <b>5V</b>    | <b>12V</b>                    | <b>15V</b>          | <b>24V</b>  |
| Output adjustment range:   | 4,5-5,5V     | 10,8-13,2V                    | 13,5-16,5V          | 21,6-26,4V  |
| Output current:  | <b>0-20A</b> | <b>0-10A</b>                  | <b>0-8A</b>         | <b>0-5A</b> |
| Ripple:  |              |                               | >40mV <sub>PP</sub> |             |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |              |                               | >0,2%               |             |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> |              |                               | >0,2%               |             |
| Transient response (10...90% I <sub>OUT</sub> ):                         |              |                               | 0,5ms               |             |
| Switching frequency, converter type:                                     |              | 100kHz                        | forward converter   |             |
| Current limit:   | >22A         | >11A                          | >8,8A               | >5,5A       |
| Short circuit protection:  |              | continuous, automatic restart |                     |             |
| Overvoltage protection (OVP):  | 5,0-7,0V     | 12,0-16,5V                    | 15,0-21,0V          | 27,0-29,0V  |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :           | >4,8V        | >11,5V                        | >14,4V              | >23,0V      |
| Temperature-coefficient/°C:  |              |                               | 0,02%               |             |
| Voltage compensation with SENSE max.NOTE 1:                              |              |                               | 0,5V                |             |
| Derating:  |              | 2,4W/°C above 55°C            |                     |             |

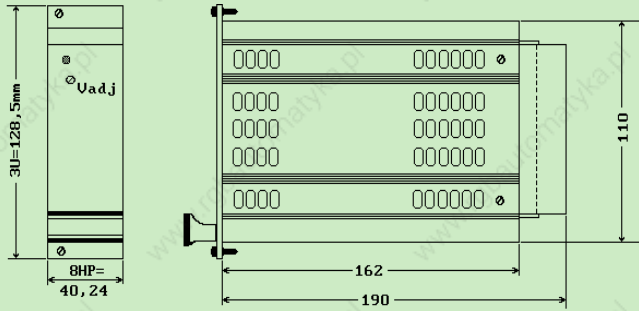
| PK240  | V1           | V1   | V1                  |
|--|--------------|--|---------------------|
| Output voltage:  | <b>5V</b>    | <b>12V</b>                                   | <b>24V</b>          |
| Output adjustment range:   | 4,5-5,5V     | 11-13V                                       | 22-26V              |
| Output current:  | <b>0-45A</b> | <b>0-20A</b>                                 | <b>0-10A</b>        |
| Ripple:  |              | >40mV <sub>PP</sub>                          |                     |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | >0,2%        | >0,35%                                       | >0,5%               |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> |              | >0,2%  |                     |
| Transient response (10...90% I <sub>OUT</sub> ):                         |              | 0,5ms  |                     |
| Switching frequency, converter type:                                     |              | 45kHz  | push-pull converter |
| Current limit:   | >46A         | >22A   | >12A                |
| Short circuit protection:  |              | continuous, automatic restart                |                     |
| Overvoltage protection (OVP):  | 5,5-6,5V     | 14,0-18,0V                                   | 26,4-30,0V          |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :           | >4,8V        | >11,5V                                       | >23V                |
| Temperature-coefficient/°C:  |              |  | 0,02%               |
| Voltage compensation with SENSE max.NOTE 1:                              |              |  | 0,5V                |
| Derating:  |              | 3HE: 8W/°C above 55°C, 6HE: 4W/°C above 55°C |                     |



# PK Series: MONOVOLT

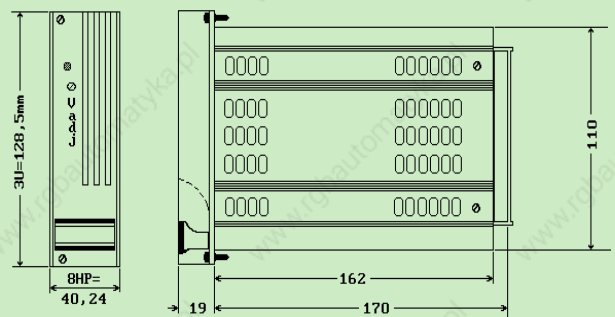
## Mechanical details

### PK30, PK60

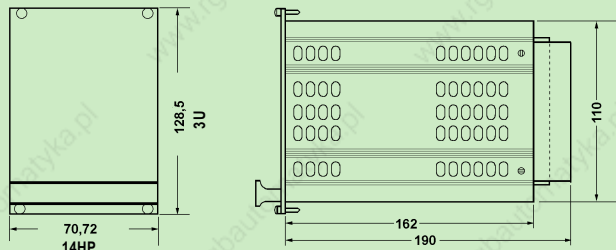


Weight: PK30, PK60, PK60R 850g

### PK 60-R

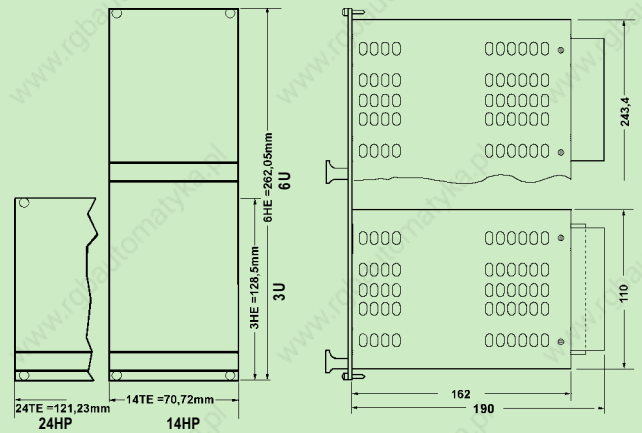


### PK120



Weight: PK120 1350g

### PK240



Weight: PK240 2200g

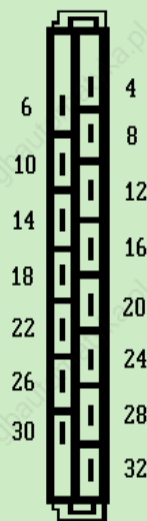
### Connector pin allocation H15-Connector

| PN                       | Function<br>PK30 | Function<br>PK60 | Function<br>PK60-R | Function<br>PK120 |
|--------------------------|------------------|------------------|--------------------|-------------------|
| 4                        | +Vout            | +Vout            | +Vout              | +Vout             |
| 6                        | +Vout            | +Vout            | +Vout              | +Vout             |
| 8                        | -Vout            | -Vout            | -Vout              | -Vout             |
| 10                       | -Vout            | -Vout            | -Vout              | -Vout             |
| 12 <small>Anm. 1</small> | +SENSE           | +SENSE           | +SENSE             | +SENSE            |
| 14 <small>Anm. 1</small> | -SENSE           | -SENSE           | -SENSE             | -SENSE            |
| 16                       | —                | Ext I/O+         | —                  | Ext I/O+          |
| 18                       | —                | PF <sub>Q</sub>  | DC FAIL            | PF <sub>Q</sub>   |
| 20                       | —                | —                | ASF                | —                 |
| 22                       | —                | PF <sub>Q</sub>  | —                  | PF <sub>Q</sub>   |
| 24                       | —                | Ext I/O-         | —                  | Ext I/O-          |
| 26                       | —                | —                | —                  | —                 |
| 28                       | N                | N                | N                  | N                 |
| 30                       | L                | L                | L                  | L                 |
| 32                       | E                | E                | E                  | E                 |

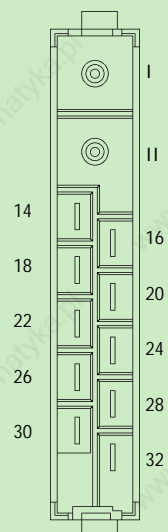
### Connector pin allocation H15+2HA-Connector

| PN                        | Function<br>PK240 |
|---------------------------|-------------------|
| I                         | +Vout             |
| II                        | -Vout             |
| 14 <small>Note. 1</small> | +SENSE            |
| 16 <small>Note. 1</small> | -SENSE            |
| 22                        | Ext on/off        |
| 24                        | PF <sub>Q</sub>   |
| 28                        | N                 |
| 30                        | L                 |
| 32                        | E                 |

### H15-connector



### H15+2HA-Connector



Note1: Sense lines must be connected. For maximum compensation for supply lead voltage drop they should be connected as close to the load as possible

# PK-Series: BIVOLT

Primary switched mode power supplies for use in 19" subracks to DIN41494, 30 or 60 Watt output.

### Features

- High regulation accuracy
- Voltages adjustable
- Compact, rugged design
- Safety approvals to UL, cUL and EN60950
- CE marked for compliance to EMC and Low Voltage Directives
- SENSE operation (5V output)
- Overvoltage (OVP) and short circuit protected
- Remote On/Off
- No minimum load required
- Coded H15 connector
- Standardized pinning



PK Series Bivolt Plug-in Power Supplies

### Ordering information

**Description: Bivolt PK30, PK60; 30 and 60 Watt outputs**

| Model         | Output voltage | Order code   |
|---------------|----------------|--------------|
| PK30 3U x 8HP | ±12 - 15V/1A   | 116-010015G* |

**Description: Bivolt PK60, 60 Watt outputs**

|                 |                    |              |
|-----------------|--------------------|--------------|
| PK60-A 3U x 8HP | ±12-15V/2A         | 116-010022A# |
| PK60-A 3U x 8HP | 5V/6A;12-15V/2A    | 116-010024F# |
| PK60-C 3U x 8HP | 5V/6A;24V/1,5A     | 116-010025C# |
| PK60-D 3U x 8HP | 12-15V/2A;24V/1,5A | 116-010080E# |

### Accessories:

|   |             |
|---|-------------|
| Reduced height front panel (PK30)       | 148-010013C |
| Reduced height front panel (PK60)       | 148-010011J |
| Mating connector coded H15 to DIN 41612 | 017-010115K |
| Coding keys (pkt 10)                    | 017-010064F |

### Technical Data PK Series: Bivolt

#### Input specification

|  |                 |
|--|-----------------|
| Input voltage selectable:                          | 115/230VAC      |
| Input frequency:                                   | 47-63Hz         |
| Inrush surge current limitation:                   | by NTC resistor |
| Input overvoltage protection:                      | by VDR          |
| Hold up time (Nominal $V_{IN}$ ; 100% $I_{OUT}$ ): | >20ms           |
| Efficiency:  | typ. >75%       |

#### Safety (Compliant with Low Voltage Directive 73/23/EEC)

|               |                 |
|---------------|-----------------|
| Certified to: | EN60950, UL1950 |
|---------------|-----------------|

#### EMC (Compliant with EMC Directive 89/336/EEC)

|  |  |
|--|--|
| Emmissions: EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz) |  |
| Immunity: EN 50082-2   |  |
| Electro Static Discharge: EN 61000-4-2                       |  |
| Electrical fast transients/Burst: EN 61000-4-4               |  |
| RF Conducted disturbance: EN 50141                           |  |
| RF Field susceptibility: EN 50140                            |  |

#### Environmental

|                        |                         |
|------------------------|-------------------------|
| Operating temperature: | 0°C to +70°C            |
| Storage temperature:   | -25°C to +85°C          |
| Relative humidity:     | Non-condensing 5% - 95% |

#### Physical

Case material/finish: Clear anodised, ventilated aluminium cassette with cooling cutouts and front or rear heat sinks as required.  
DIN 41494 part 5 compatible

\* EN60950 and UL certified

# EN60950

# PK-Series: BIVOLT

## Output specifications

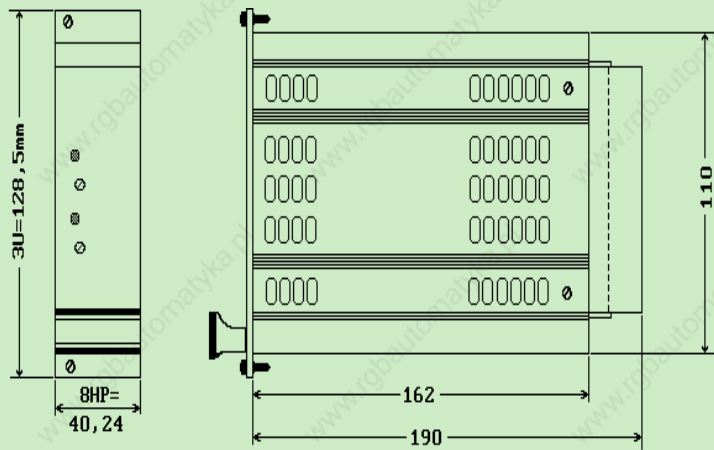
| PK30   | V1, V2                        |
|--|-------------------------------|
| Output voltage:  | <b>±12V - 15V</b>             |
| Output adjustment range:   | -                             |
| Output current:  | <b>±0-1A</b>                  |
| Ripple:  | <3mV <sub>PP</sub>            |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,02%                        |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,5%                         |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 10ms                          |
| Switching frequency, converter type:                                     | 20-50kHz flyback converter    |
| Current limit:   | >2,2A                         |
| Short circuit protection:  | continuous, automatic restart |
| Overvoltage protection (OVP):  | -                             |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | -                             |
| Temperature coefficient/°C:  | 0,02%                         |
| Voltage compensation with SENSE max.NOTE1:                               | 0,5V                          |
| Derating:  | 1,3W/°C above 55°C            |

| PK60   | A:V1,V2             | B:V1,V2                    | C:V1,V2   | D:V1,V2                   |
|--|---------------------|----------------------------|---|---------------------------|
| Output voltage:  | <b>±12-15V</b>      | <b>5V(4,5-5,5V)/12-15V</b> | <b>5V(4,5-5,5V)/24V(22-26V)</b>                         | <b>12-15V/24V(22-26V)</b> |
| Output current:  | <b>±0-2A</b>        | <b>0-6/0-2A</b>            | <b>0-6/0-1,5A</b>                                       | <b>0-2/0-1,5A</b>         |
| Ripple:  | <20mV <sub>PP</sub> | <40mV <sub>PP</sub>        | <40mV <sub>PP</sub>                                     | <40mV <sub>PP</sub>       |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |                     |                            | <0,2%   |                           |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,5%               | <0,2%/0,5%                 | <0,2%/0,5%  | <0,5%                     |
| Transient response (10...90% I <sub>OUT</sub> ):                         |                     |                            | 1ms   |                           |
| Switching frequency, converter type:                                     |                     |                            | 25-50kHz flyback converter                              |                           |
| Current limit:   | >2,2A               | >6,5A/>2,2A                | >6,5A/>1,5A   | >2,2A/>1,5A               |
| Short circuit protection:  |                     |                            | continuous, automatic restart                           |                           |
| Overvoltage protection (OVP):  |                     |                            | fixed on 5V output, optional to special order on others |                           |
| Temperature-Coefficient/°C:  |                     |                            | 0,02%   |                           |
| Voltage compensation with SENSE max.NOTE1:                               |                     |                            | 0,5V maximum on 5V outputs                              |                           |
| Derating:  |                     |                            | 1,6W/°C above 55°C                                      |                           |

## Mechanical details

### PK30, PK60

Weight PK30, PK60: 850 g



### Pin allocation - H15 Connector

| PIN       | function |         |   |         |        |         |
|-----------|----------|---------|---|---------|--------|---------|
|           | PK30     | PK60    | A | B       | C      | D       |
| 4         | ---      | ---     |   | +5V     | +5V    | +12-15V |
| 6         | ---      | ---     |   | +5V     | +5V    | +12-15V |
| 8         | ---      | ---     |   | 0V      | 0V     | 0V      |
| 10        | ---      | ---     |   | 0V      | 0V     | 0V      |
| 12 Note 1 | ---      | ---     |   | +SENSE  | +SENSE | ---     |
| 14 Note 1 | ---      | ---     |   | -SENSE  | -SENSE | ---     |
| 16        | ---      | ---     |   | ---     | ---    | ---     |
| 18        | +12-15V  | +12-15V |   | ---     | ---    | ---     |
| 20        | 0V       | 0V      |   | +12-15V | +24V   | +24V    |
| 22        | -12-15V  | -12-15V |   | 0V      | 0V     | 0V      |
| 24        | ---      | ---     |   | ---     | ---    | ---     |
| 26        | ---      | ---     |   | ---     | ---    | ---     |
| 28        | N        | N       |   | N       | N      | N       |
| 30        | L        | L       |   | L       | L      | L       |
| 32        | E        | E       |   | E       | E      | E       |

**Note 1:** Sense lines must be connected. For maximum compensation for supply lead voltage drop they should be connected as close to the load as possible.



# PK-Series: TRIVOLT

Primary switched mode power supplies for use in 19" subracks to DIN41494, 60 to 250 Watts output.

## Features

- 3 high stability outputs, all adjustable
- Safety approvals to UL, cUL and EN60950
- CE marked for compliance to EMC and Low Voltage Directives
- SENSE operation (5V output)
- Overvoltage (OVP) protection (5V output)
- Short circuit protected
- Powerfail signal
- No minimum load required
- Coded H15 connector
- Standardized pinning



PK-Series TRIVOLT Power Supply

## Ordering information

Description: TRIVOLT PK60; 3U x 8HP, 60 Watt output power

| Model     | Outputs |            |              | Order-Code          |
|-----------|---------|------------|--------------|---------------------|
|           | V1      | V2         | V3           |                     |
| PK60-A    | 5V/6A   | +12-15V/1A | -12-15V/1A   | <b>116-010018J*</b> |
| PK60-A PF | 5V/6A   | +12-15V/1A | -12-15V/1A   | <b>116-010103A#</b> |
| PK60-B    | 5V/6A   | +12-15V/2A | -12-15V/0,5A | <b>116-010101G*</b> |
| PK60-B PF | 5V/6A   | +12-15V/2A | -12-15V/0,5A | <b>116-010102D#</b> |

Description: Trivolt PK120; 3U x 14HP, 6U x 8HP 120Watt output power

|             |           |                   |                     |
|-------------|-----------|-------------------|---------------------|
| PK120 3U    | V1:5V/12A | V2/V3: ±12-15V/2A | <b>116-010046C#</b> |
| PK120 6U    | V1:5V/12A | V2/V3: ±12-15V/2A | <b>116-010047L#</b> |
| PK120 6U PF | V1:5V/12A | V2/V3: ±12-15V/2A | <b>116-010079D#</b> |
| PK120 3U PF | V1:5V/12A | V2/V3: ±12-15V/2A | <b>116-010078G#</b> |

Description: Trivolt PK125; 6U x 8HP, 125 Watt output power

|       | V1     | V2      | V3      |                    |
|-------|--------|---------|---------|--------------------|
| PK125 | 5V/13A | +12V/4A | -12V/1A | <b>116-010182E</b> |

Description: Trivolt PK250-2; 6U x 14HP, 250 Watt output power

|                       | V1     | V2      | V3      |                     |
|-----------------------|--------|---------|---------|---------------------|
| PK250 with VME-Signal | 5V/30A | +12V/6A | -12V/3A | <b>116-010115B#</b> |

## Description: Accessories

|  |                   |
|--|-------------------|
| Reduced height front panel: PK60                   | <b>148-10010A</b> |
| Reduced height front panel: PK120, 3U              | <b>148-10020H</b> |
| Mating connector coded H15 to DIN 41612            | <b>017-10115K</b> |
| Mating connector coded H15+2HA faston to DIN 41612 | <b>017-10138K</b> |
| Coding keys (pkt 10)                               | <b>017-10064F</b> |

Note: PF = Powerfail

## Technical Data PK Series: Trivolt

### Input specification

|  |                 |
|--|-----------------|
| Input voltage switchable:                          | 115/230VAC      |
| Input frequency:                                   | 47-63Hz         |
| Inrush surge current limitation:                   | by NTC resistor |
| Input overvoltage protection:                      | by VDR          |
| Hold up time (Nominal $V_{IN}$ ; 100% $I_{OUT}$ ): | >20ms           |
| Efficiency:  | typ. >75%       |

### Safety (Compliant with Low Voltage Directive 73/23/EEC)

Certified to: EN60950, IEC 950, UL1950, VDE 0805

### EMC (Compliant with EMC Directive 89/336/EEC)

|  |              |
|--|--------------|
| Emmissions: EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz) |              |
| Immunity:  | EN 50082-2   |
| Electro Static Discharge:                                    | EN 61000-4-2 |
| Electrical fast transients/Burst:                            | EN 61000-4-4 |
| RF Conducted disturbance:                                    | EN 50141     |
| RF Field susceptibility:                                     | EN 50140     |

### Environmental

|                        |                         |
|------------------------|-------------------------|
| Operating temperature: | 0°C to +70°C            |
| Storage temperature:   | -25°C to +85°C          |
| Relative humidity:     | Non-condensing 5% - 95% |

### Physical

Case material/finish: Clear anodised, ventilated aluminium cassette with cooling cutouts and front or rear heat sinks as applicable.  
DIN 41494 part 5 compatible

\* EN60950 and UL certified

# EN60950

# PK Series: TRIVOLT

## Output specifications

| PK60   | V1                  | Version A: V2,V3              | Version B: V2,V3   |
|--|---------------------|-------------------------------|--------------------|
| Output voltage:  | <b>5V</b>           | <b>±12-15V</b>                | <b>±12-15V</b>     |
| Output adjustment range:   | 4,5-5,5V            | -                             | -                  |
| Output current:  | <b>0-6A</b>         | <b>±0-1A</b>                  | <b>+2A/-0-0,5A</b> |
| Ripple:  | <40mV <sub>PP</sub> | <3mV <sub>PP</sub>            | <3mV <sub>PP</sub> |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,2%               | <0,02%                        | <0,02%             |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,2%               | <0,2% (0,75%)                 | <0,5% (0,75%)      |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 1ms                 | 10ms                          | 10ms               |
| Switching frequency, converter type:                                     |                     | 20-50kHz flyback converter    |                    |
| Current limit:   | >6,5A               | >±1,1A                        | >2,1A/0,6A         |
| Short circuit protection:Short circuit protection:                       |                     | continuous, automatic restart |                    |
| Overvoltage protection (OVP):  | 6-6,7V              | -                             | -                  |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | <4,8V               | -                             | -                  |
| Temperature-Coefficient/°C:  |                     | 0,02%                         |                    |
| Voltage compensation with SENSE max. <sub>NOTE1</sub> :                  | 0,5V                | -                             | -                  |
| Derating:  |                     | 1,6W/°C above 45°C            |                    |

| PK120  | V1                  | V2,V3                               |
|--|---------------------|-------------------------------------|
| Ausgangsspannung:  | <b>5V</b>           | <b>±12-15V</b>                      |
| Output adjustment range:   | 4,5-5,5V            | -                                   |
| Output current:  | <b>0-12A</b>        | <b>0-2A</b>                         |
| Ripple:  | <40mV <sub>PP</sub> | <20mV <sub>PP</sub>                 |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |                     | <0,02%                              |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> |                     | <0,2%                               |
| Transient response (10...90% I <sub>OUT</sub> ):                         | <0,2ms              | <0,5ms                              |
| Switching frequency, converter type:                                     |                     | 25-100kHz flyback/forward converter |
| Current limit:   | >12,5A              | >2,2A                               |
| Short circuit protection:Short circuit protection:                       |                     | continuous, automatic restart       |
| Overvoltage protection (OVP):  | 5,5-6,0V            | -                                   |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | <4,8V               | -                                   |
| Temperature-Coefficient/°C:  |                     | 0,02%                               |
| Voltage compensation with SENSE max. <sub>NOTE1</sub> :                  | 0,5V                | -                                   |
| Derating:  |                     | 4W/°C above 55°C                    |

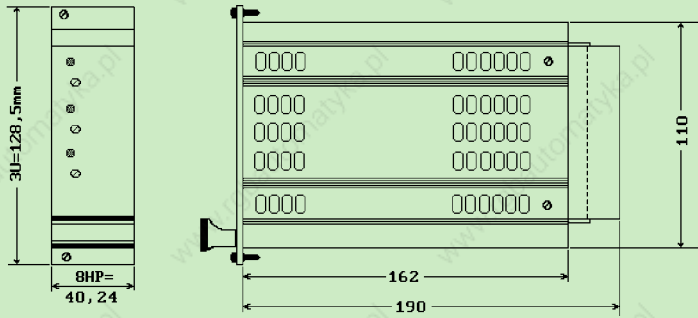
| PK125  | V1   | V2                      | V3          |
|--|--|-------------------------|-------------|
| Ausgangsspannung:  | <b>5V</b>  | <b>12V</b>              | <b>-12V</b> |
| Output adjustment range:   | 4,5-5,5V   | 10,8-13,2V              | -10,8-13,2V |
| Ausgangsgleichstrom:   | <b>0-13A</b>   | <b>0-4A</b>             | <b>0-1A</b> |
| Ripple:  |  | <40mV <sub>PP</sub>     |             |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,3%  | <0,2%                   | <0,2%       |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> |  | <0,2%                   |             |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 1ms  | 1ms                     | 1ms         |
| Switching frequency, converter type:                                     |  | 50kHz forward converter |             |
| Current limit:   | >14A   | >5A                     | >1A         |
| Short circuit protection:  | continuous, automatic restart                          |                         |             |
| Overvoltage protection (OVP):  | 6,0-6,7V adjustable                                    | -                       | -           |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | ACFAIL and SYSRESET in accordance with VME spec. rev D |                         |             |
| Temperature-Coefficient/°C:  |  | 0,05%                   |             |
| Voltage compensation with SENSE max. <sub>NOTE1</sub> :                  | 0,5V   | -                       | -           |
| Derating:  |  | 3W/°C above 55°C        |             |

| PK250  | V1   | V2                                   | V3          |
|--|--|--------------------------------------|-------------|
| Ausgangsspannung:  | <b>5V</b>  | <b>12V</b>                           | <b>-12V</b> |
| Output adjustment range:   | 4,5-5,5V   | 10,8-13,2V                           | -10,8-13,2V |
| Output current:  | <b>0-30A</b>   | <b>0-6A</b>                          | <b>0-3A</b> |
| Ripple:  |  | <40mV <sub>PP</sub>                  |             |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |  | <0,2%                                |             |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,2%  | <1%                                  | <1%         |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 1ms  | 2ms                                  | 2ms         |
| Switching frequency, converter type:                                     |  | 50kHz halfbridge push-pull converter |             |
| Current limit:   | >31A   | >6,5A                                | >3,5A       |
| Short circuit protection:  |  | continuous, automatic restart        |             |
| Overvoltage protection (OVP):  | 5,5-7,0V adjustable                                    | -                                    | -           |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | ACFAIL and SYSRESET in accordance with VME spec. rev D |                                      |             |
| Temperature-Coefficient/°C:  |  | 0,05%                                |             |
| Voltage compensation with SENSE max. <sub>NOTE1</sub> :                  | 0,5V   | -                                    | -           |
| Derating:  |  | 6W/°C above 55°C                     |             |

# PK Series: TRIVOLT

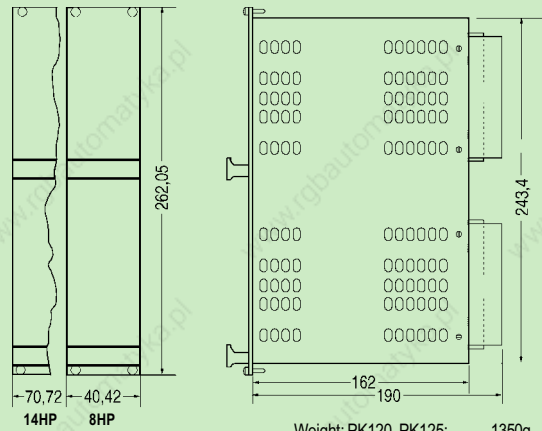
## Mechanical details

PK60



Weight: PK60: 850g

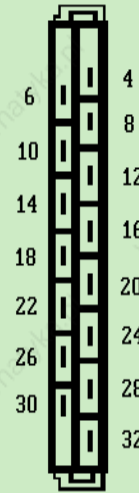
PK120, PK125, PK250



Weight: PK120, PK125: 1350g  
Weight: PK250: 2500g

### Pin allocation H15-connector

| PN | Function | PK120   |
|----|----------|---------|
| 4  | +5V      | +5V     |
| 6  | +5V      | +5V     |
| 8  | -Vout    | -Vout   |
| 10 | -Vout    | -Vout   |
| 12 | +SENSE   | +SENSE  |
| 14 | -SENSE   | -SENSE  |
| 16 | PF α     | PF α    |
| 18 | +12-15V  | +12-15V |
| 20 | 0V       | 0V      |
| 22 | -12-15V  | -12-15V |
| 24 | —        | —       |
| 26 | —        | —       |
| 28 | N        | N       |
| 30 | L        | L       |
| 32 | E        | E       |



### Pin allocation - H15+2HA connector

| PN | Function S2      | PIN | Function S1 (DIN41612 - C96) |
|----|------------------|-----|------------------------------|
|    | <i>PK125/250</i> |     | <i>PK125/250</i>             |
| I  | +5V              | B3  | AC FAIL                      |
| II | 0V               | C12 | SYS RESET                    |
| 14 | +SENSE           | C9  | 0V                           |
| 16 | -SENSE           |     |                              |
| 18 | +12V             |     |                              |
| 20 | 0V (±12V)        |     |                              |
| 22 | -12V             |     |                              |
| 28 | N                |     |                              |
| 30 | L                |     |                              |
| 32 | E                |     |                              |



AC-DC



## EC Series



MONOVOLT EC50  
TRIVOLT EC50/125

ec50  
ec125  
ec50  
ec125  
ec50  
ec125  
ec50  
ec125  
ec50

# EC-Series: MONOVOLT

Primary switched mode 50 Watt single output power supplies for use in 19" subracks to DIN41494

## Features

- Reduced cost primary switched mode power supply
- Plastic coated steel cover
- Overvoltage protection (OVP)
- No load and short circuit proof
- Powerfail signal
- Coded H15 connector
- Standardized pinning



EC50 MONOVOLT Power Supplies

## Ordering information

Description: Economy power supply; 3U x 8HP, 50Watt output

| Type                 | Output   | Order-code  |
|----------------------|----------|-------------|
| EC-50                | 5V/8A    | 116-010188J |
| EC-50 with Powerfail | 5V/8A    | 116-010189F |
| EC-50                | 12V/4A   | 116-010190G |
| EC-50                | 15V/3,5A | 116-010192A |
| EC-50                | 24V/2,2A | 116-010194F |

## Description: Accessories

|  |             |
|--|-------------|
| Front panel kit with handle, idents and screws | 148-010002K |
| Mating connector coded H15 to DIN 41612        | 017-010115K |
| Coding keys Pkt 10                             | 017-010064F |

## Technical Data EC Series: Monovolt EC50

### Input specification

|  |                      |
|--|----------------------|
| Input voltage:                                     | 93-264VAC wide input |
| Input frequency:                                   | 47-63Hz              |
| Inrush surge current limitation:                   | by NTC resistor      |
| Input overvoltage protection:                      | by VDR               |
| Hold up time (Nominal $V_{IN}$ ; 100% $I_{OUT}$ ): | >20ms                |
| Efficiency:  | typ. 68-75%          |

### Safety (Compliant with Low Voltage Directive 73/23/EEC)

Certified to, or meets the requirement of: EN60950, IEC 950, VDE 0805, EN41003 (EC100)

### EMC (Compliant with EMC Directive 89/336/EEC)

|                                   |                         |
|-----------------------------------|-------------------------|
| Emmissions:                       | EN 55022/B (0,15-30MHz) |
| Immunity:                         | EN50082-2               |
| Electro Static Discharge:         | EN61000-4-2             |
| Electrical fast transients/Burst: | EN61000-4-4             |
| RF Conducted disturbance:         | EN50141                 |
| RF Field susceptibility:          | EN50140                 |

### Environmental

|                        |                         |
|------------------------|-------------------------|
| Operating temperature: | 0°C to +70°C            |
| Storage temperature:   | -25°C to +85°C          |
| Relative humidity:     | Non-condensing 5% - 95% |

### Physical

Case material/finish: ventilated plastic coated steel cassette with cooling cutouts and rear heat sink.  
DIN 41494 part 5 compatible

\* EN 60950 certified

## Output specifications

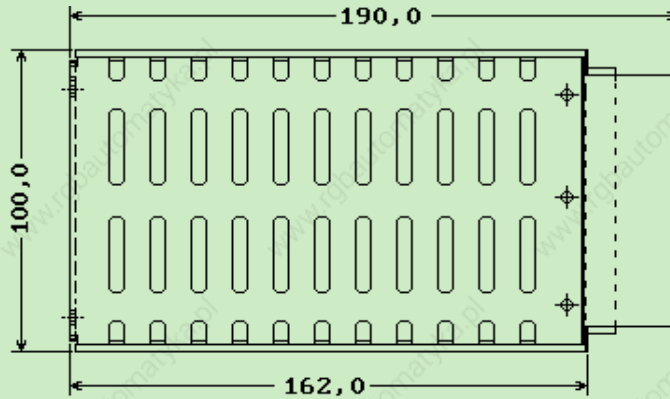
| EC50  | V1       | V1   | V1                            | V1         |
|---|----------|--|-------------------------------|------------|
| Output voltage:   | 5V       | 12V  | 15V                           | 24V        |
| Adjustment range:   | 4,5-5,5V | 10,8-13,2V   | 13,5-16,5V                    | 21,6-26,4V |
| Output current:   | 0-8A     | 0-4A   | 0-3,5A                        | 0-2,2A     |
| Ripple:   |          |  | >40mV <sub>pp</sub>           |            |
| Line regulation (100% $I_{OUT}$ ): $\Delta iV_{OUT}$            |          |  | >0,2%                         |            |
| Load regulation static (10...90% $I_{OUT}$ ): $\Delta iV_{OUT}$ |          |  | >1%                           |            |
| Transient response (10...90% $I_{OUT}$ ):                       |          |  | >1ms                          |            |
| Switching frequency, converter type::                           |          |  | 25kHz Flyback converter       |            |
| Current limit:  | >8,8A    | >4,4A  | >3,8A                         | >2,4A      |
| Overvoltage protection (OVP):                                   |          |  | continuous, automatic restart |            |
| Overvoltage protection (OVP):                                   | 6-6,7V   | 15,5-18V   | 17-19,5V                      | 27-32V     |
| Powerfail Signal (at full load) >6ms before $V_{OUT}$ :         |          | >6ms (@110VAC); >80ms (@220VAC) before $V1 < 4,8VAC$ |                               |            |
| Temperature-Coefficient/°C:                                     |          |  | 0,05%                         |            |
| Voltage compensation with SENSE max,NOTE1:                      |          |  | -                             |            |
| Derating:   |          |  | 1,2W/°C above 45°C            |            |

# EC-Series: MONOVOLT

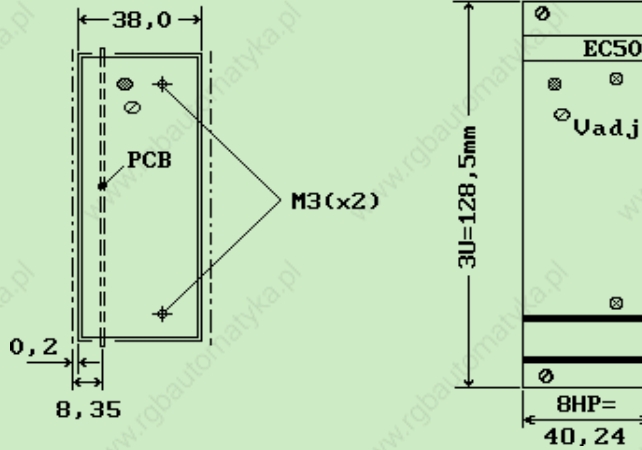
## Mechanical Details

### EC50

Weight: EC50 650g



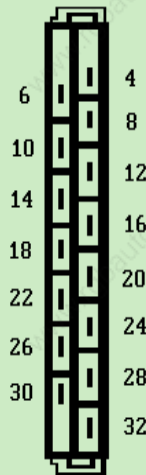
### EC50 Front panels



### Pin allocation - H15 Connector

| PIN | Function EC50 |
|-----|---------------|
| 4   | +Vout         |
| 6   | +Vout         |
| 8   | -Vout         |
| 10  | -Vout         |
| 12  | -             |
| 14  | -             |
| 16  | PF $\bar{Q}$  |
| 18  | —             |
| 20  | —             |
| 22  | —             |
| 24  | —             |
| 26  | —             |
| 28  | N             |
| 30  | L             |
| 32  | E             |

### H15 Connector





## EC-Series: TRIVOLT

Primary switched mode 50 or 125 Watt triple power supplies for use in 19" subracks to DIN41494

### Features

- Economy priced alternative of PK series
- Compact, rugged design
- Safety to approvals to UL, cUL and EN60950
- Overvoltage (OVP) and short circuit protected
- Powerfail signal
- Coded H15 connector
- Standardized pinning



EC 50, EC 125 TRIVOLT Power Supplies

### Ordering information

Description: TRIVOLT EC50; 3Ux 8HP, 50 Watt Output

| Type   | Outputs                     | Order-Code        |                |
|--------|-----------------------------|-------------------|----------------|
|        |                             | without Powerfail | with Powerfail |
| EC50-A | 5V/5A, +12V/1,8A, -12V/0,4A | 116-010130J*      | 116-010131F*   |
| EC50-B | 5V/5A, +15V/1,4A, -15V/0,3A | 116-010183B*      | 116-010184K*   |
| EC50-C | 5V/5A, ±15V/0,8A            | 116-010186D*      | 116-010187A*   |
| EC50-D | 5V/5A, ±12V/1A              | 116-010217B*      | 116-010218K*   |

Description: TRIVOLT EC125; 3U x 14HP, 6U x 8HP, 125 Watt Output

| Type      | Outputs                  | Order-Code        |                |
|-----------|--------------------------|-------------------|----------------|
|           |                          | without Powerfail | with Powerfail |
| EC125, 3U | 5V/13A, +12V/4A, -12V/1A | 116-010214L       | -              |
| EC125, 6U | 5V/13A, +12V/4A, -12V/1A | 116-010185G       | -              |

Description: EC Series; accessories

|   | Order code  |
|---|-------------|
| Frontpanel kit with handle, idents and screws: EC50     | 148-010002K |
| 3U Frontpanel kit with handle, idents and screws: EC125 | 148-010005A |
| 6U Frontpanel kit with handle, idents and screws: EC125 | 148-010003G |
| Mating connector coded H15 to DIN 41612                 | 017-010115K |
| Coding keys Pkt 10                                      | 017-010064F |

### Technical Data EC Series: TRIVOLT EC50, EC125

#### Input Specifications

|  |  |
|--|--|
| Input voltage AC-DC:                               | 93-264VAC wide input EC50, 115/230VAC switchable EC125 |
| Input frequency:                                   | 47-63Hz  |
| Inrush surge current limitation:                   | by NTC-resistor  |
| Input overvoltage protection:                      | by VDR   |
| Hold up time (Nominal $V_{IN}$ ; 100% $I_{OUT}$ ): | >20ms  |
| Efficiency:  | typ. >70%  |

#### Safety (Compliant with Low Voltage Directive 73/23/EEC)

Safety according: EN60950, IEC 950, VDE 0805

#### EMC (Compliant with EMC Directive 89/336/EEC)

|                           |                         |
|---------------------------|-------------------------|
| Emmissions:               | EN 55022/B (0,15-30MHz) |
| Immunity:                 | EN50082-2               |
| Electro Static Discharge: | EN61000-4-2             |
| Burst:                    | EN61000-4-4             |
| RF Conducted disturbance: | EN50141                 |
| RF Field susceptibility:  | EN50140                 |

#### Environmental

|                        |                         |
|------------------------|-------------------------|
| Operating temperature: | 0°C to +70°C            |
| Storage temperature:   | -25°C to +85°C          |
| Relative humidity:     | Non-condensing 5% - 95% |

#### Physical

Case material/finish: zinc coated steel cover with cooling cutouts and rear heat sink. DIN 41494 part 5 compatible5

\* EN 60950 certified

# EC Series: TRIVOLT

## Output Specifications

| TRIVOLT EC50A  | V1                              | V2                                  | V3                  |
|--|---------------------------------|-------------------------------------|---------------------|
| Output voltage:  | <b>5V</b>                       | <b>+12V</b>                         | <b>-12V</b>         |
| Adjustment range:  | 4,5-5,5V                        | ~V1                                 | fixed               |
| Output current:  | <b>0-5A</b>                     | <b>0-1,8A</b>                       | <b>0-0,4A</b>       |
| Output current at single loading:  | <b>8A</b> <small>NOTE 1</small> | <b>4A</b> <small>NOTE 1</small>     | <b>0,8A</b>         |
| Ripple:  | >40mV <sub>PP</sub>             | >40mV <sub>PP</sub>                 | >10mV <sub>PP</sub> |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |                                 | <0,2%                               |                     |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | >1%                             | >5% <small>NOTE 2</small>           | >0,5%               |
| Transient response (10...90% I <sub>OUT</sub> ):                         |                                 | >1ms                                |                     |
| Switching frequency, converter type:                                     |                                 | 50kHz flyback converter             |                     |
| Current limit:   | >6A(>9A <small>NOTE 3</small> ) | >2,2A(>4,5A <small>NOTE 3</small> ) | >0,8A               |
| Short circuit protection:  |                                 | continuous, automatic restart       |                     |
| Overvoltage protection (OVP):  | 6-6,7V                          | -                                   | -                   |
| Temperature-coefficient/°C:  |                                 | 0,05%                               |                     |
| Voltage compensation with SENSE max.:                                    |                                 | -                                   |                     |
| Derating:  |                                 | 1,5W/°C above 45°C                  |                     |

| TRIVOLT EC50B  | V1                              | V2  | V3                  |
|--|---------------------------------|---|---------------------|
| Output voltage:  | <b>5V</b>                       | <b>+15V</b>                                     | <b>-15V</b>         |
| Adjustment range:  | 4,5-5,5V                        | ~V1   | fixed               |
| Output current:  | <b>0-5A</b>                     | <b>0-1,4A</b>                                   | <b>0-0,3A</b>       |
| Output current at single loading:  | <b>8A</b> <small>NOTE 1</small> | <b>3A</b> <small>NOTE 1</small>                 | <b>0,6A</b>         |
| Ripple:  | <40mV <sub>PP</sub>             | <40mV <sub>PP</sub>                             | <10mV <sub>PP</sub> |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |                                 | <0,2%   |                     |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <1%                             | <3% <small>NOTE 2</small>                       | <0,5%               |
| Transient response (10...90% I <sub>OUT</sub> ):                         |                                 | <1ms  |                     |
| Switching frequency, converter type:                                     |                                 | 50kHz flyback converter                         |                     |
| Current limit:   | >6A(>9A <small>NOTE 3</small> ) | >1,7A(>3,5A <small>NOTE 3</small> )             | >0,6A               |
| Short circuit protection:  |                                 | continuous, automatic restart                   |                     |
| Overvoltage protection (OVP):  | 6-6,7V                          | -   | -                   |
| Powerfail Signal (at full load) :  |                                 | >6ms (@110VAC); >80ms (@220VAC) before V1 <4,8V |                     |
| Temperature-coefficient/°C:  |                                 | 0,05%   |                     |
| Voltage compensation with SENSE max.:                                    |                                 | -   |                     |
| Derating:  |                                 | 1,5W/°C above 45°C                              |                     |

| TRIVOLT EC50C  | V1                              | V2, V3  |
|--|---------------------------------|---|
| Output voltage:  | <b>5V</b>                       | <b>±15V</b>                                     |
| Adjustment range:  | 4,5-5,5V                        | fixed   |
| Output current:  | <b>0-5A</b>                     | <b>0-0,8A</b>                                   |
| Output current at single loading:  | <b>8A</b> <small>NOTE 1</small> | <b>1A</b>                                       |
| Ripple:  | <40mV <sub>PP</sub>             | <10mV <sub>PP</sub>                             |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |                                 | <0,2%   |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <1%                             | <0,5%   |
| Transient response (10...90% I <sub>OUT</sub> ):                         |                                 | <1ms  |
| Switching frequency, converter type:                                     |                                 | 50kHz flyback converter                         |
| Current limit:   | >6A(>9A <small>NOTE 3</small> ) | >1,1A   |
| Short circuit protection:  |                                 | continuous, automatic restart                   |
| Overvoltage protection (OVP):  | 6-6,7V                          | -   |
| Powerfail Signal (at full load):   |                                 | >6ms (@110VAC); >80ms (@220VAC) before V1 <4,8V |
| Temperature-coefficient/°C:  |                                 | 0,05%   |
| Voltage compensation with SENSE max.:                                    |                                 | -   |
| Derating:  |                                 | 1,5W/°C above 45°C                              |

# EC Series: TRIVOLT

## Output Specifications

| TRIVOLT EC50D  | V1  | V2, V3                        |
|--|---|-------------------------------|
| Output voltage:  | <b>5V</b>                                       | <b>±12V</b>                   |
| Adjustment range:  | 4,5-5,5V  | fixed                         |
| Output current:  | <b>0-5A</b>                                     | <b>0-0,8A</b>                 |
| Output current at single loading:  | <b>8A</b> <small>NOTE 1</small>                 | <b>1A</b>                     |
| Ripple:  | <40mV <sub>PP</sub>                             | <10mV <sub>PP</sub>           |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |   | <0,2%                         |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <1%   | <0,5%                         |
| Transient response (10...90% I <sub>OUT</sub> ):                         |   | <1ms                          |
| Switching frequency, converter type:                                     |   | 50kHz flyback converter       |
| Current limit:   | >6A (>9A <small>NOTE 3</small> )                | >1,1A                         |
| Short circuit protection:  |   | continuous, automatic restart |
| Overvoltage protection (OVP):  | 6-6,7V  | -                             |
| Powerfail Signal (at full load)  | >6ms (@110VAC); >80ms (@220VAC) before V1 <4,8V |                               |
| Temperature-coefficient/°C:  | 0,05%   |                               |
| Voltage compensation with SENSE max.:                                    | -   |                               |
| Derating:  | 1,5W/°C above 45°C                              |                               |

Note 1. 60 Seconds max

Note 2. I<sub>2</sub> = 0,1-4 x I<sub>OUT</sub>

Note 3. Single load

Note 4. V2/V3 output EC50 C+D linear regulated

| TRIVOLT EC125  | V1                  | V2                            | V3                  |
|--|---------------------|-------------------------------|---------------------|
| Output voltage:  | <b>5V</b>           | <b>+12V</b>                   | <b>-12V</b>         |
| Adjustment range:  | 4,5-5,5V            | 10,8-13,2V                    | -10,8 to -13,2V     |
| Output current:  | <b>0-13A</b>        | <b>0-4A</b>                   | <b>0-1A</b>         |
| Ripple:  | <40mV <sub>PP</sub> | <40mV <sub>PP</sub>           | <10mV <sub>PP</sub> |
| Line regulation(100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>             | <0,3%               | <0,2%                         | <0,2%               |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> |                     | <0,2%                         |                     |
| Transient response (10...90% I <sub>OUT</sub> ):                         |                     | <1ms                          |                     |
| Switching frequency, converter type:                                     |                     | 100kHz forward converter      |                     |
| Current limit:   | >14A                | >5A                           | >1A                 |
| Short circuit protection:  |                     | continuous, automatic restart |                     |
| Overvoltage protection (OVP):  | 6-6,7V              | -                             | -                   |
| Powerfail Signal:  |                     | -                             | -                   |
| Temperature-coefficient/°C:  |                     | 0,05%                         |                     |
| Voltage compensation with SENSE max.:                                    | 0,5V                | -                             | -                   |
| Derating:  |                     | 2,5W/°C above 45°C            |                     |

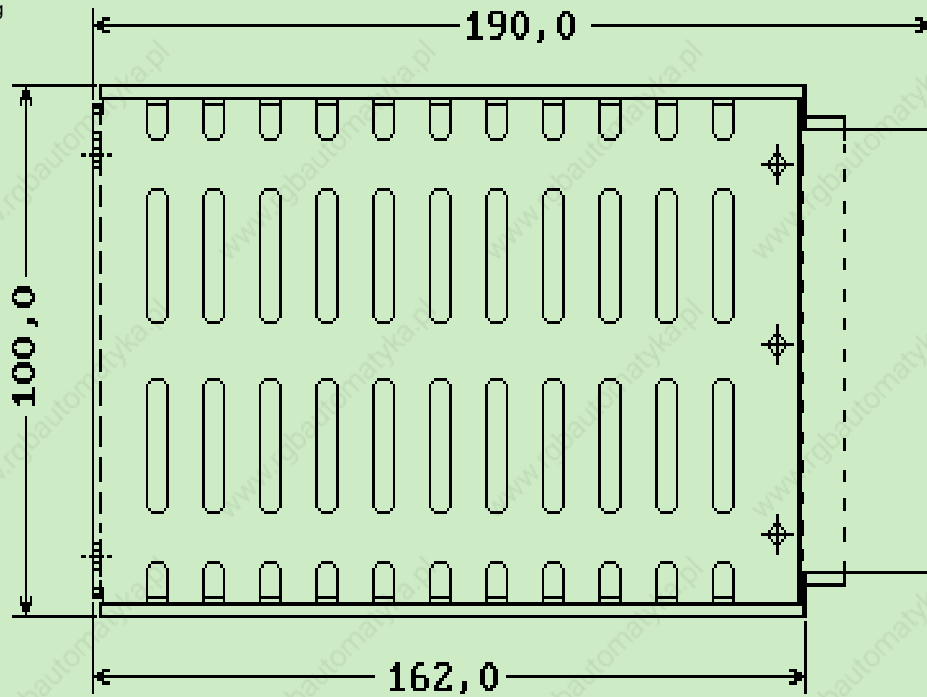


# EC Series: TRIVOLT

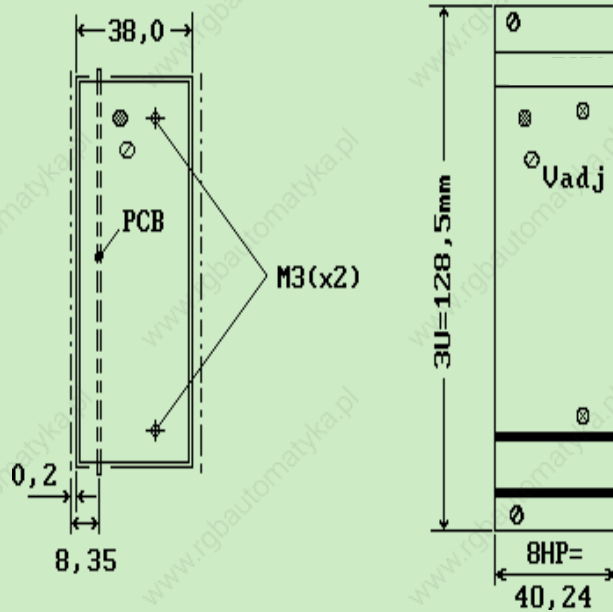
## Mechanical Details

### TRIVOLT EC50

Weight EC50: 650g



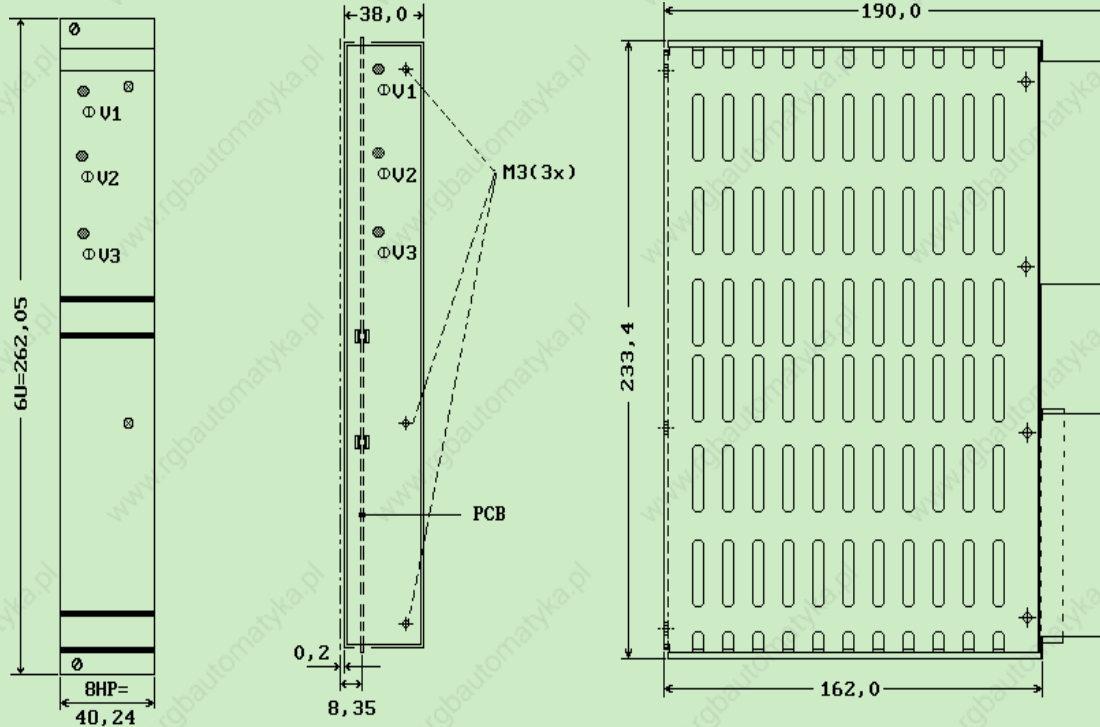
### Front panel kit



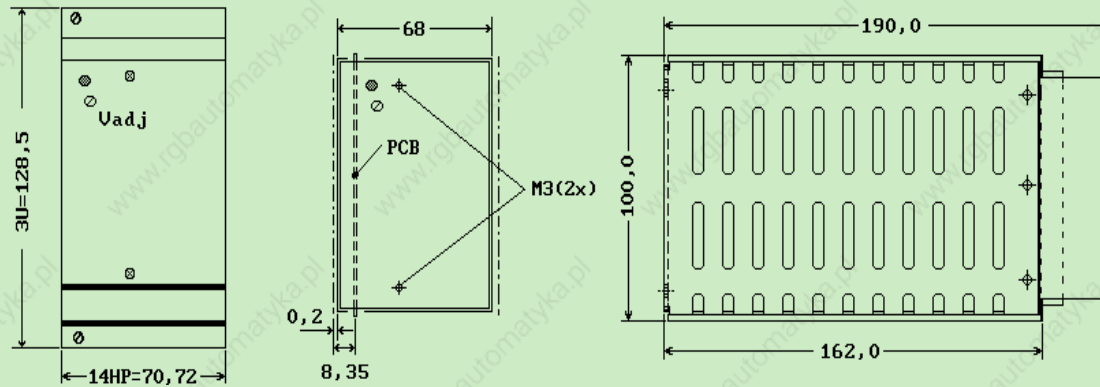
# EC-Series: TRIVOLT

## Mechanical Details

### TRIVOLT EC125



### Front panel kit

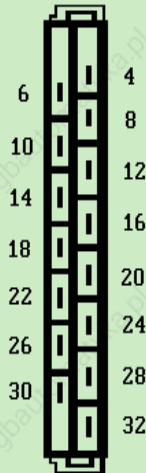


Weight EC125: 1350g

### Pin allocation H15-Connector

| PIN | Function EC50 Trivolt | Function EC125 Trivolt |
|-----|-----------------------|------------------------|
| 4   | +Vout                 | +Vout                  |
| 6   | +Vout                 | +Vout                  |
| 8   | -Vout                 | -Vout                  |
| 10  | -Vout                 | -Vout                  |
| 12  | NC                    | +Sense                 |
| 14  | NC                    | -Sense                 |
| 16  | PF Q                  | -                      |
| 18  | +V2                   | +V2                    |
| 20  | GND V2, V3            | GND V2, V3             |
| 22  | -V3                   | -V3                    |
| 24  | NC                    | NC                     |
| 26  | NC                    | NC                     |
| 28  | N                     | N                      |
| 30  | L                     | L                      |
| 32  | E                     | E                      |

H15 Connector



AC-DC

## Cased Power Supplies: PO500-3 with active PFC

The PO Series is a range of power factor corrected cased power supplies producing 500 Watts output power and three outputs for complex industrial computer systems, i.e. VMEbus based systems

### Features

- Power Factor Correction (PFC), power factor >0,97
- 110-230VAC wide input
- Meets UL 1950, cUL and EN 60 950 safety
- ACFAIL and SYSRESET VME specific signals
- Connection via universal screw terminals
- Completely cased, including cooling fan
- Special versions available (minimum order quantity 25 pieces)

### Ordering information

**Description:** Trivolt power supply; 500 Watt output

| Model               | Outputs                  | Order code         |
|---------------------|--------------------------|--------------------|
| PO500-3             | 5V/75A, +12V/8A, -12V/3A | <b>137-010000L</b> |
| PO500-3 Ext. on/off | 5V/75A, +12V/8A, -12V/3A | <b>137-010001H</b> |



PO500-3 with active PFC

### Technical Data PO Series: Trivolt

#### Input specification

|  |                      |
|--|----------------------|
| Input voltage:                                     | 94-230VAC wide input |
| Input frequency:                                   | 47-63Hz              |
| Input overvoltage protection:                      | by VDR               |
| Hold up time (Nominal $V_{IN}$ ; 100% $I_{OUT}$ ): | >20ms at 230VAC      |
| Efficiency:  | typ. 80%             |

#### Safety (Compliant with Low Voltage Directive 73/23/EEC)

|               |                               |
|---------------|-------------------------------|
| Certified to: | EN60950, IEC 950, UL1950, cUL |
|---------------|-------------------------------|

#### EMC (Compliant with EMC Directive 89/336/EEC)

|  |              |
|--|--------------|
| Emmissions: EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz) |              |
| Immunity:  | EN 50082-2   |
| Electro Static Discharge:                                    | EN 61000-4-2 |
| Electrical fast transients/Burst:                            | EN 61000-4-4 |
| RF Conducted disturbance:                                    | EN 50141     |
| RF Field susceptibility:                                     | EN 50140     |
| Surge susceptibility:  | EN 61000-4-5 |
| Harmonic distortion:   | EN 61000-3-2 |

#### Environmental

|                        |                         |
|------------------------|-------------------------|
| Operating temperature: | 0°C to +65°C            |
| Storage temperature:   | -25°C to +85°C          |
| Relative humidity:     | Non-condensing 5% - 95% |

#### Physical

|                       |                                     |
|-----------------------|-------------------------------------|
| Dimensions: PO500-3   | 127mm wide x 63mm high x 320mm deep |
| Weight: PO500-3       | 3000g                               |
| Case material/finish: | Clear anodised aluminium            |

# Cased Power Supplies: PO500-3 with active PFC

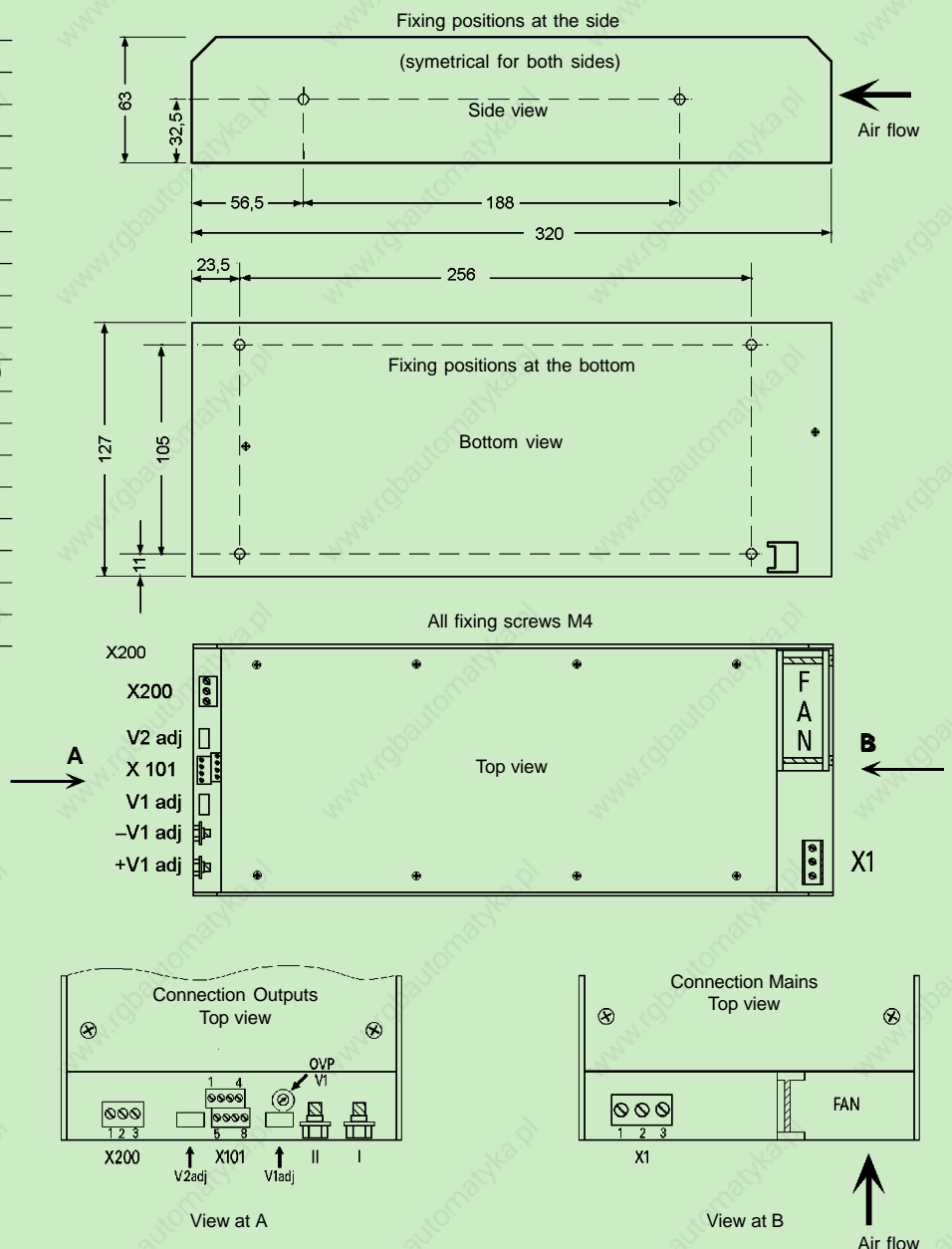
## Output specifications

| PO500  | V1   | V2                   | V3                                   |
|--|--|----------------------|--------------------------------------|
| Output voltage:  | 5V   | 12V                  | -12V                                 |
| Adjustment range:  | 4,5-5,5V   | 11-13V               | fixed                                |
| Output current:  | 75A  | 8A                   | 3A                                   |
| Ripple:  |  | <50mV <sub>PP</sub>  |                                      |
| Noise:   |  | <100mV <sub>PP</sub> |                                      |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            |  | <0,2%                |                                      |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,5%  | <0,2%                | Typ. <0,2% (20-90%I <sub>OUT</sub> ) |
| Current limit:   | >75,1A   | >8,1A                | >3,1A                                |
| Short circuit protection:  |  | yes                  |                                      |
| Over voltage protection (OVP):   | 6,0V (5,5-6,75V adjustable)                                      | 14,4V (fixed)        | -                                    |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | ACFAIL and SYSRESET in accordance with VME specification, Rev C1 |                      |                                      |
| External On/Off:   | by jumper (closed = off, open = on), isolated                    |                      |                                      |
| Temperature coefficient/°C:  |  | <0,05%               |                                      |
| Voltage compensation with SENSE max.,ANM 1:                              | 0,5V   | -                    | -                                    |
| Derating:  |  | 12,5W/°C above 50°C  |                                      |

## Mechanical Details

### Pin allocation

| Screw block | PIN | Function    |
|-------------|-----|-------------|
| 5 Volt      | I   | +V1         |
|             | II  | -V1         |
|             |     |             |
| X200        | 1   | -V3         |
|             | 2   | GND V2/V3   |
|             | 3   | +V2         |
| Screw block | PIN | Function    |
| X101        | 1   | Ext. On/Off |
|             | 2   | SYSRESET*   |
|             | 3   | NC          |
|             | 4   | *SIGNAL GND |
|             | 5   | Ext. On/Off |
|             | 6   | AC-FAIL     |
|             | 7   | -SENSE V1   |
|             | 8   | +SENSE V1   |
| Screw block | PIN | Function    |
| X1          | 1   | E (Earth)   |
|             | 2   | N (Neutral) |
|             | 3   | L (Live)    |



AC-DC



# TPS-Series: 1-3 Outputs and active PFC

Primary switched mode power supplies with side heat sinks for use in 19" subracks to DIN41494, 100 to 150 Watt output power.

**Features**

- Power Factor Correction (PF>0,97)
- Universal input
- Compact, rugged design
- Power share on outputs 1 and 2
- CE marked for compliance to EMC and Low Voltage Directives
- Safety to approvals to UL, cUL and EN60950

**General**

The Danica TPS 3102 and TPS 3152 power supply series are equipped with Power Sharing, so two or more units can operate in parallel and redundant. Power fail signal (PWF) and Remote sense\* (\* single output only) are standard.

**Order information**

**Description:** EA-TPS3102-1, EA-TPS3102-3, EA-TPS3152-1, EA-TPS3152-3

**Description: EA-TPS3102 100W Power supply**

| Type             | Outputs   | Art. Nb. |
|------------------|---|----------|
| EA-TPS 3102-1-05 | 5V/20A  | 17120107 |
| EA-TPS 3102-1-12 | 12V/8A  | 17120108 |
| EA-TPS 3102-1-24 | 24V/4A  | 17120109 |
| EA-TPS 3102-1-48 | 48V/2A  | 17120110 |
| EA-TPS 3102-3-00 | V1:5V/20A, V2: 12V/8A, V3: 12V/2,5A <small>Note 1</small> | 17120111 |

Note 1) Maximum output power 100 W

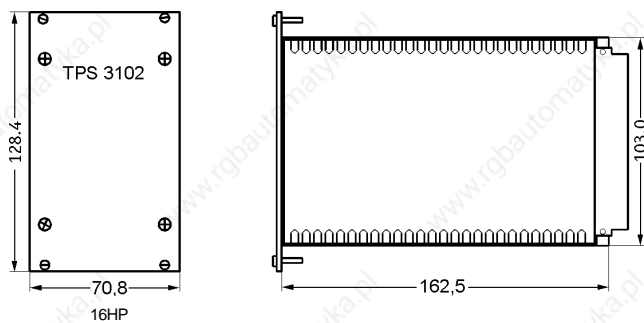
**Description: EA-TPS3152 150W Power supply**

|                  |  |          |
|------------------|--|----------|
| EA-TPS 3152-1-05 | 5V/30A   | 17120112 |
| EA-TPS 3152-1-12 | 12V/12A  | 17120113 |
| EA-TPS 3152-1-24 | 24V/6A   | 17120114 |
| EA-TPS 3152-1-48 | 48V/3A   | 17120115 |
| EA-TPS 3152-3-00 | V1:5V/30A, V2: 12V/12A, V3: 12V/2,5A <small>Note 2</small> | 17120116 |

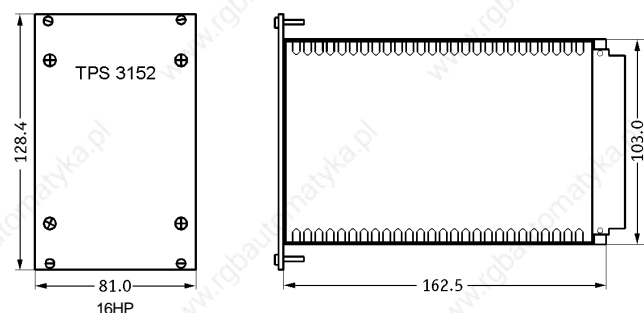
Note 2) Maximum output power 150 W

**Dimensions**

**TPS 3102**



**TPS 3152**



TPS3152

**Technical Data of TPS3102-1, TPS3102-3, TPS3152-1, TPS3152-3**

**Input Data**

|  |             |
|--|-------------|
| Input voltage:                                     | 93-264VAC   |
| Input frequency:                                   | 44-65Hz     |
| Inrush current limit:                              | Minimal     |
| Input overvoltage protection:                      | VDR         |
| Hold up time (Nominal $V_{IN}$ ; 100% $I_{OUT}$ ): | 20ms        |
| Efficiency:  | typ. 75-85% |

**Safety (Compliant with Low Voltage Directive 73/23/EEC)**

Safety according: EN60950

**EMC (Compliant with EMC Directive 89/336/EEC)**

Emmissions: EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz)

**Environmental**

|                        |                                     |
|------------------------|-------------------------------------|
| Operating temperature: | 0°C to +70°C / Derating >55°C 5W/°C |
| Storage temperature:   | -25°C to +85°C (-45°C to +85°C)     |
| Relative humidity:     | max. 90% non-condensing             |

**Physical**

|                                 |   |
|---------------------------------|---|
| Dimensions: EA-TPS3102 19"-Rack | 3U x 14HP x 160mm<br>(70,8mm wide x 128,5mm high)                         |
| Dimensions: EA-TPS3152 19"-Rack | 3U x 16HP x 160mm<br>(81,0mm wide x 128,5mm high)                         |
| Weight: EA-TPS3102              | 1100g   |
| Weight: EA-TPS3152              | 1100g   |
| Case material/finish:           | ventilated aluminium with side heat sinks.<br>DIN 41494 part 5 compatible |

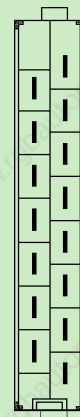
**Pin allocation H15-connector**

**Single Output**



- 4 NC
- 6 + SENSE
- 8 - SENSE
- 10 + OUT
- 12 + OUT
- 14 + OUT
- 16 RTN
- 18 RTN
- 20 RTN
- 22 SHARE
- 24 Power fail
- 26 NC
- 28 Input AC N
- 30 Input AC L
- 32 GND PE

**Triple Output**



- 4 + Output 3
- 6 + Output 2
- 8 - Output 3 RTN
- 10 + Output 1
- 12 + Output 1
- 14 + Output 1
- 16 Output 1&2 RTN
- 18 Output 1&2 RTN
- 20 Output 1&2 RTN
- 22 SHARE
- 24 Power fail
- 26 NC
- 28 INPUT AC N
- 30 INPUT AC L
- 32 GND PE

# TPS-Series: 1-3 Outputs and active PFC

## Output specifications

| EA-TPS3102-1   | V1                       | V1                  | V1                  | V1                   |
|--|--------------------------|---------------------|---------------------|----------------------|
| Output voltage:  | 5V                       | 12V                 | 24V                 | 48V                  |
| Adjustment range:  | fixed                    |                     |                     |                      |
| Output current:  | 20A                      | 8A                  | 4A                  | 2A                   |
| Ripple:  | <50mV <sub>PP</sub>      | <50mV <sub>PP</sub> | <50mV <sub>PP</sub> | <100mV <sub>PP</sub> |
| Current limit:   | 22-32A                   | 10-15A              | 5-8A                | 2,5-5,0A             |
| Switching frequency, converter type:                                     | 67kHz, flyback converter |                     |                     |                      |
| Over voltage protection (OVP):   | 5,8V                     | 13V                 | 27V                 | 54V                  |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub>            |                          |                     |                     | 0,1%                 |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub> |                          |                     |                     | 0,5%                 |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           |                          |                     |                     | yes                  |
| Temperature coefficient/°C:  |                          |                     |                     | 0.02%                |
| Voltage compensation with SENSE max.:                                    |                          |                     |                     | 0,5V                 |
| Derating: above 55°C   |                          |                     |                     | 5,0W/°C              |

| EA-TPS3102-3*  | V1                       | V2     | V3       |
|--|--------------------------|--------|----------|
| Output voltage:  | 5V                       | 12V    | 12V      |
| Adjustment range:  | fixed                    |        |          |
| Output current:  | 20A                      | 8A     | 2,5A     |
| Ripple:  | 50mV <sub>PP</sub>       |        |          |
| Current limit:   | 22-32A                   | 10-15A | 2,7-4,0A |
| Switching frequency, converter type:                                     | 67kHz, flyback converter |        |          |
| Over voltage protection (OVP):   | 5,8V                     | -      | -        |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub>            | 0,1%                     | 0,1%   | 0,1%     |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub> | 1,5%                     | 1,0%   | 1,0%     |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | yes                      |        |          |
| Temperature coefficient/°C:  | 0.02%                    |        |          |
| Voltage compensation with SENSE max.:                                    | 0,5V                     |        |          |
| Derating: above 55°C   | 5,0W/°C                  |        |          |

\* Max output power 100W

| EA-TPS3152-1   | V1                       | V1                  | V1                  | V1                   |
|--|--------------------------|---------------------|---------------------|----------------------|
| Output voltage:  | 5V                       | 12V                 | 24V                 | 48V                  |
| Adjustment range:  | 4,8-5,5V                 | 11-13V              | 22-26V              | 22-26V               |
| Output current:  | 30A                      | 12A                 | 6A                  | 3A                   |
| Ripple:  | <50mV <sub>PP</sub>      | <50mV <sub>PP</sub> | <50mV <sub>PP</sub> | <100mV <sub>PP</sub> |
| Current limit:   | 32-45A                   | 13-18A              | 7-12A               | 3,2-4,0A             |
| Switching frequency, converter type:                                     | 67kHz, flyback converter |                     |                     |                      |
| Over voltage protection (OVP):   | 5,8V                     | 15V                 | 28V                 | 52V                  |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub>            |                          |                     |                     | 0,1%                 |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub> |                          |                     |                     | 0,5%                 |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           |                          |                     |                     | yes                  |
| Temperature coefficient/°C:  |                          |                     |                     | 0,02%                |
| Voltage compensation with SENSE max.:                                    |                          |                     |                     | 0,5V                 |
| Derating: above 40°C   |                          |                     |                     | 3,75W/°C             |

| EA-TPS3152-3*  | V1                       | V2     | V3       |
|--|--------------------------|--------|----------|
| Output voltage:  | 5V                       | 12V    | 12V      |
| Adjustment range:  | 4,8-5,5V                 | 11-13V | 14-16V   |
| Output current:  | 30A                      | 12A    | 2,5A     |
| Ripple:  | <50mV <sub>PP</sub>      |        |          |
| Current limit:   | 32-45A                   | 13-18A | 2,7-4,0A |
| Switching frequency, converter type:                                     | 67kHz, flyback converter |        |          |
| Over voltage protection (OVP):   | 5,8V                     | 13V    | -        |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub>            |                          |        | 0,1%     |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>VOUT</sub> | 2%                       | 1,0%   | 1%       |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | yes                      |        |          |
| Temperature coefficient/°C:  | 0,02%                    |        |          |
| Voltage compensation with SENSE max.:                                    | 0,5V                     |        |          |
| Derating: above 40°C   | 3,75W/°C                 |        |          |

\* Max output power 150W

# TPS-4000: Single Output with active PFC, 550W

Primary switched mode power supplies with side heat sinks for use in 19" subracks to DIN41494, with 550 Watt output power.

### Features

- Power Factor Correction (PF>0,97)
- Universal input
- N+1, Hot pluggable, (6U x 16HP)
- Remote Sense
- Power share with parallel operating units
- CE marked for compliance to EMC and Low Voltage Directives
- Safety to approvals to UL, cUL and EN60950
- Available as battery charger

### Ordering information

Model: EA-TPS 4000

### Ordering information

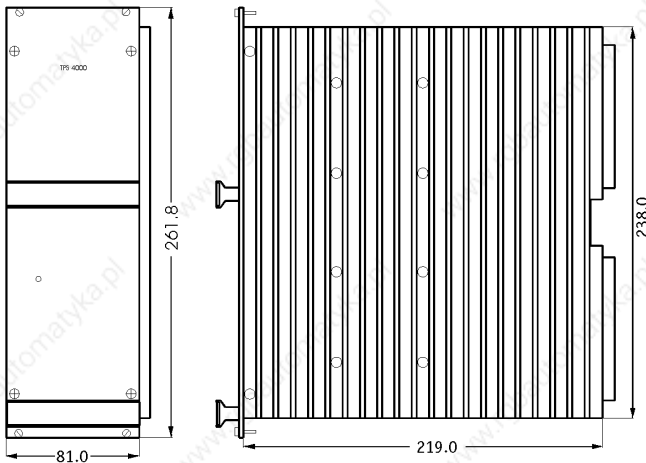
Model: EA-TPS4000 550W Power Supply

|                |         |          |
|----------------|---------|----------|
| EA-TPS 4000-12 | 12V/35A | 17120119 |
| EA-TPS 4000-24 | 24V/20A | 17120120 |
| EA-TPS 4000-48 | 48V/10A | 17120121 |

Model: EA-TPS 4000 550W Charger

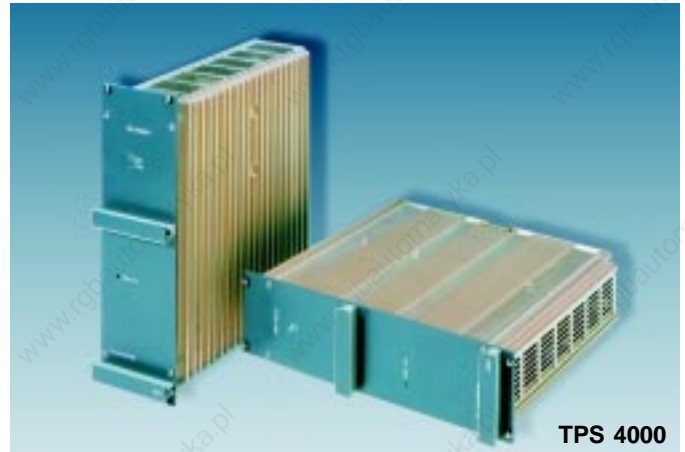
|                |           |          |
|----------------|-----------|----------|
| EA-TPS 4000-28 | 28,3V/20A | 17120122 |
| EA-TPS 4000-54 | 54,5V/10A | 17120123 |

### Dimensions TPS 4000



### Technical Data

| EA-TPS 4000                                       | V1         | V1                  | V1         |
|---|------------|---------------------|------------|
| Output Voltage:                                   | <b>12V</b> | <b>24V</b>          | <b>48V</b> |
| Ripple:   |            | 150mV <sub>PP</sub> |            |
| Output current:                                   | <b>35A</b> | <b>20A</b>          | <b>10A</b> |
| -limit:   | >40A       | >24A                | >12A       |
| Switching frequency:                              | 70kHz      |                     |            |
| Oversvoltage protection (OVP):                    | 16V        | 32V                 | 60V        |
| Line regulation (100% IOU): iVOUT                 | 0,2%       |                     |            |
| Load regulation (10...90% IOU): iVOUT             | 0,2%       |                     |            |
| Powerfail-Signal (at full load) >6ms before VOUT: | yes        |                     |            |
| Temperature-coefficient/°C:                       | 0,02%      |                     |            |
| Remote SENSE max.:                                | 0,5V       |                     |            |
| Derating: above 55°C                              | 20W/°C     |                     |            |



TPS 4000

### Technical Data TPS4000

#### Input Specifications

|                                       |             |
|---------------------------------------|-------------|
| Input Voltage:                        | 93-264VAC   |
| Input frequency:                      | 44-65Hz     |
| Inrush current limit:                 | <40A        |
| Input overvoltage protection:         | VDR         |
| Hold up time (Nominal VIN; 100% IOU): | 20ms        |
| Efficiency:                           | typ. 85-90% |

#### Safety (Compliant with Low Voltage Directive 73/23/EEC)

Safety according: EN60950

#### EMC (Compliant with EMC Directive 89/336/EEC)

Emmissions: EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz)

#### Environmental

|                        |                                      |
|------------------------|--------------------------------------|
| Operating temperature: | 0°C to +70°C / Derating >55°C 40W/°C |
| Storage temperature:   | -25°C bis +85°C (-45°C bis +85°C)    |
| Relative humidity:     | max. 90% non-condensing              |

#### Physical

|                                 |   |
|---------------------------------|---|
| Dimensions: EA-TPS4000 19"-Rack | 6U x 16HP x 220<br>(81,0mm wide x 261,8mm high)                           |
| Weight: EA-TPS4000              | 3600g   |
| Case material/finish:           | ventilated aluminium with side heat sinks.<br>DIN 41494 part 5 compatible |

#### Pin allocation H15-connector

##### Upper



- 4 Input AC N
- 6 Input AC N
- 8 Input AC L
- 10 Input AC L
- 12 Shutdown
- 14 Shutdown
- 16 NC
- 18 NC
- 20 Internal use
- 22 Internal use
- 24 NC
- 26 NC
- 28 NC
- 30 Share
- 32 GND PE

##### Lower



- 4 -OUT
- 6 -OUT
- 8 -OUT
- 10 -OUT
- 12 - Sense
- 14 + Sense
- 16 +OUT
- 18 +OUT
- 20 +OUT
- 22 +OUT
- 24 NC
- 26 NC
- 28 Battery test
- 30 NC
- 32 GND PE

# TPS-5000: Single Output with active PFC, 1200W

Primary switched mode power supplies with side heat sinks for use in 19" subracks to DIN41494, with 1200 Watt output power.

### Features

- Power Factor Correction (PF>0,97)
- Universal input
- N+1, Hot plugable
- Power share with parallel operating units
- CE marked for compliance to EMC and Low Voltage Directives
- Safety to approvals to UL, cUL and EN60950
- Available as battery charger

### Ordering information

Model: EA-TPS 5000



TPS 5000

### Ordering information

Model: EA-TPS5000 1200W Power supply

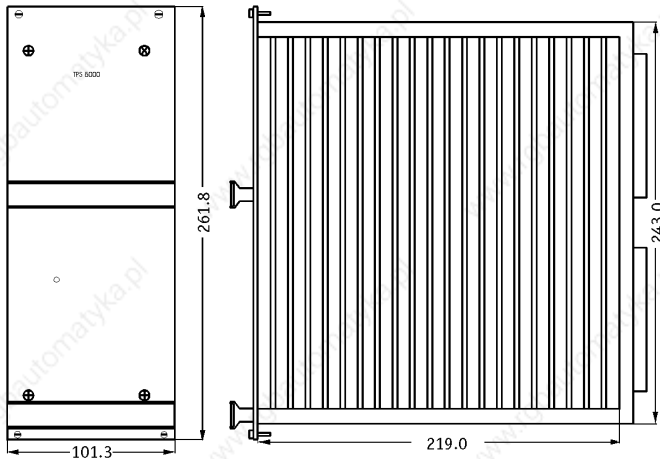
|                |         |          |
|----------------|---------|----------|
| EA-TPS 5000-24 | 24V/40A | 17120124 |
| EA-TPS 5000-48 | 48V/20A | 17120125 |

Model: EA-TPS5000 1200W Charger

|                |           |          |
|----------------|-----------|----------|
| EA-TPS 5000-28 | 28,3V/40A | 17120126 |
| EA-TPS 5000-54 | 54,5V/20A | 17120127 |

### Dimensions

TPS 5000



### Technical Data

| EA-TPS 5000   | V1                  | V1         |
|---|---------------------|------------|
| Output voltage:   | <b>24V</b>          | <b>48V</b> |
| Ripple:   | 100mV <sub>PP</sub> |            |
| Output current:   | <b>40A</b>          | <b>20A</b> |
| Current limit:  | >44A                | >22A       |
| Switching frequency:  |                     | 70kHz      |
| Overvoltage protection (OVP):                                   | 32V                 | 64V        |
| Line regulation (100% IO <sub>UT</sub> ): iV <sub>OUT</sub>     |                     | 0,2%       |
| Load regulation (10...90% IO <sub>UT</sub> ): iV <sub>OUT</sub> |                     | 0,2%       |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :  |                     | yes        |
| Temperature-coefficient/°C:                                     |                     | 0,02%      |
| Remote SENSE max.:  |                     | 0,5V       |
| Derating: above 55°C  |                     | 40W/°C     |

### Technical Data TPS 5000

#### Input Specifications

|  |             |
|--|-------------|
| Input Voltage:   | 176-264VAC  |
| Input frequency:   | 44-65Hz     |
| Inrush current limit:  | <40A        |
| Input overvoltage protection:                                    | VDR         |
| Hold up time (Nominal V <sub>in</sub> ; 100% IO <sub>UT</sub> ): | 20ms        |
| Efficiency:  | typ. 85-90% |

**Safety (Compliant with Low Voltage Directive 73/23/EEC)**  
**Safety according : EN60950**

#### EMC (Compliant with 89/336/EEC)

Emissions: EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz)

#### Environmental

|                        |                                      |
|------------------------|--------------------------------------|
| Operating temperature: | 0°C to +70°C / Derating >55°C 40W/°C |
| Storage temperature:   | -45°C to +85°C                       |
| Relative humidity:     | max. 90% non-condensing              |

#### Physical

|                                  |   |
|----------------------------------|---|
| Dimensions: EA-TPS 5000 19"-Rack | 6U x 20HP x 219<br>(101,3mm wide x 261,8mm high)                          |
| Weight: EA-TPS 5000              | 4800g   |
| Case material/finish:            | ventilated aluminium with side heat sinks.<br>DIN41494, part 5 compatible |

### Pin allocation H15-connector

#### Upper



- 4 Input AC N
- 6 Input AC N
- 8 Input AC L
- 10 Input AC L
- 12 Shutdown
- 14 Shutdown
- 16 NC
- 18 NC
- 20 Internal use
- 22 Internal use
- 24 NC
- 26 NC
- 28 NC
- 30 Share
- 32 GND PE

#### Lower



- 4 -OUT
- 6 -OUT
- 8 -OUT
- 10 -OUT
- 12 - Sense
- 14 + Sense
- 16 +OUT
- 18 +OUT
- 20 +OUT
- 22 +OUT
- 24 NC
- 26 NC
- 28 Battery test
- 30 NC
- 32 GND PE



# TPS-5500: Single Output with active PFC, 1800W

Primary switched mode power supplies with side heat sinks for use in 19" subracks to DIN41494, with 1800 Watt output power.

### Features

- Power Factor Correction (PF>0,97)
- Wide input range 176-264VAC
- N+1, Hot pluggable, (6U, 16HP x 345mm)
- Power share with parallel operating units
- Safety according EN60950, UL, CUL
- CE marked for compliance to EMC and Low Voltage Directives
- Available as battery charger

### Ordering information

Model: EA-TPS5500



TPS 5500

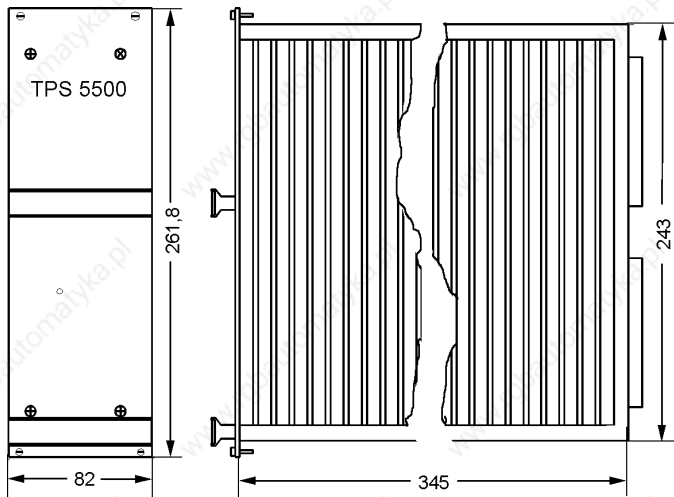
### Ordering information

Model: EA-TPS5500 1800W Power supply

|                |         |          |
|----------------|---------|----------|
| EA-TPS 5500-48 | 48V/30A | 17120130 |
|----------------|---------|----------|

### Dimensions

#### TPS 5500



### Technical Data

|  |                             |
|--|-----------------------------|
| EA-TPS 5500                                      | V1                          |
| Output voltage:                                  | 40...60V factory set: 53,5V |
| Ripple:  | 200mV <sub>PP</sub>         |
| Output current:                                  | 0...30A                     |
| Current limit:                                   | 30A, max. 33A, V/A          |
| Switching frequency:                             | 70kHz                       |
| Overvoltage protection (OVP):                    | 64V                         |
| Line regulation (100% IOUT): iVOUT               | 0,2%                        |
| Load regulation (10...90% IOUT): iVOUT           | 0,2%                        |
| Powerfail-Signal (at full load)>6ms before VOUT: | yes                         |
| Temperature-coefficient/°C                       | 0,02%                       |
| Remote SENSE max.:                               | 0,5V                        |
| Derating: above 55°C                             | 40W/°C                      |

### Technical Data TPS 5500

#### Input Data

|  |             |
|--|-------------|
| Input voltage:   | 176-264VAC  |
| Input frequency:   | 44-65Hz     |
| Inrush current limit:  | 20A max.    |
| Input overvoltage protection:                                    | VDR         |
| Hold up time (Nominal V <sub>IN</sub> ; 100% I <sub>OUT</sub> ): | 20ms        |
| Efficiency:  | typ. 85-90% |

#### Safety (Compliant with Low Voltage Directive 73/23/EEC)

Safety according: EN60950

#### EMC (Compliant with EMC Directive 89/336/EEC)

Emmissions: EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz)

#### Environmental

|                        |                                      |
|------------------------|--------------------------------------|
| Operating temperature: | 0°C to +70°C / Derating >55°C 40W/°C |
| Storage temperature:   | -45°C to +85°C                       |
| Relative humidity:     | max. 90% non-condensing              |

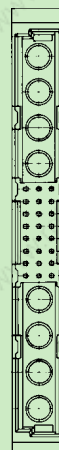
#### Physical

|                                 |   |
|---------------------------------|---|
| Dimensions: EA-TPS5500 19"-Rack | 6HE x 16TE x 345mm  |
| Weight: EA-TPS5500              | 6000g   |
| Case material/finish:           | ventilated aluminium with side heat sinks.<br>DIN 41494 part 5 compatible |

### Output Connector

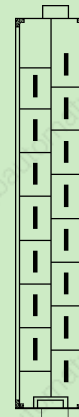
### H15 Connector

#### Lower



- NC
- NC
- NC
- NC
- NC
- Controle-, BUS- and Sense connections
- + Output
- + Output
- Output
- Output

#### Upper



- 4 Input AC L
- 6 Input AC L
- 8 Input AC L
- 10 Input AC L
- 12 Input AC L
- 14 Input AC N
- 16 Input AC N
- 18 Input AC N
- 20 Input AC N
- 22 Input AC N
- 24 NC
- 26 NC
- 28 NC
- 30 GND PE
- 32 GND PE

# TPS 6000: Single Output with active PFC, 3000W

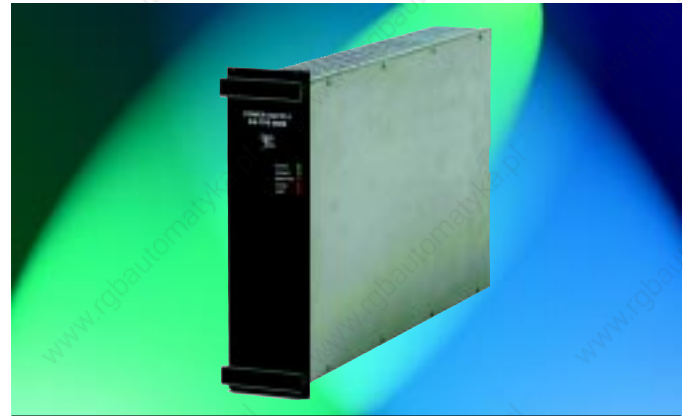
Primary switched mode power supplies for use in 19" subracks to DIN41494, with 3000 Watt output power.

### Features

- Power Factor Correction (PF>0,97)
- High efficiency (>89%)
- N+1, Hot plugable
- Power share with parallel operating units
- Safety according EN60950
- CE marked for compliance to EMC and Low Voltage Directives
- Available as battery charger

### Ordering information

Model: EA-TPS 6000



TPS6000

### Technical Data TPS6000

#### Input Data

|                                      |             |
|--------------------------------------|-------------|
| Input voltage:                       | 230VAC ±10% |
| Input frequency:                     | 44-65Hz     |
| Inrush current limit (cold at 25°C): | <30A        |
| Input overvoltage protection:        | VDR         |
| Efficiency:                          | typ. >89%   |

#### Safety (Compliant with Low Voltage Directive 73/23/EEC)

Safety according: EN60950

#### EMC (Compliant with EMC Directive 89/336/EEC)

Emmissions: EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz)

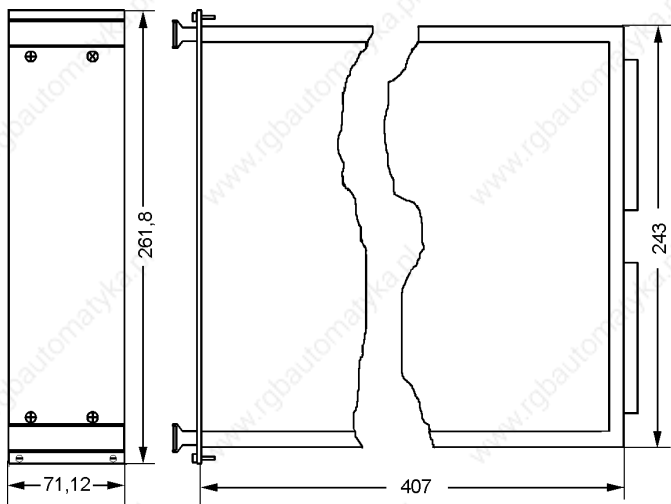
#### Environmental

|   |                               |
|---|-------------------------------|
| Operating temperature:                  | 0°C to +40°C / Derating >40°C |
| The units must be cooled by forced air. |                               |
| Storage temperature:                    | -25°C to +85°C                |
| Relative humidity:                      | max. 90% non-condensing       |

#### Physical

|                                |                             |
|--------------------------------|-----------------------------|
| Dimensions EA-TPS6000 19"-Rack | 6HE x 14TE x 407mm          |
| Weight: EA-TPS 6000            | 7000g                       |
| Case material/finish:          | aluminium                   |
|                                | DIN 41494 part 5 compatible |

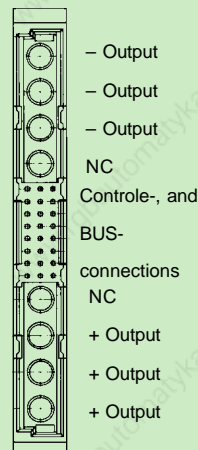
### Dimensions TPS 6000



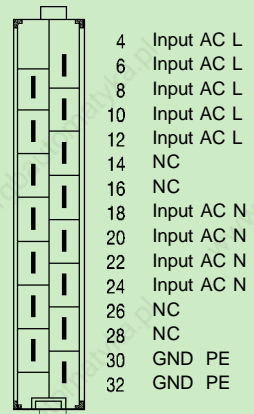
### Technical Data

|  |                         |
|--|-------------------------|
| EA-TPS 6000  | V1                      |
| Output voltage, programmable   | 40...60V (set to 54,5V) |
| Ripple:  | <200mV <sub>pp</sub>    |
| Output current:  | 0...55A                 |
| Current limit:   | 55A, max. 60A, V/I      |
| Switching frequency:   | 120kHz                  |
| Overvoltage protection (OVP):  | typ. 67V                |
| Line regulation (100% I <sub>OUT</sub> ): iV <sub>OUT</sub>            | 0,2%                    |
| Load regulation static (10...90% I <sub>OUT</sub> ): iV <sub>OUT</sub> | 0,2%                    |
| Fault-Signals  | yes                     |
| Derating:  | above 40°C              |

### Output Connector Lower



### H15 Connector Upper



AC-DC

DC-DC

**DC/DC Converter**



**TPS-Series**  
**GK-Series**

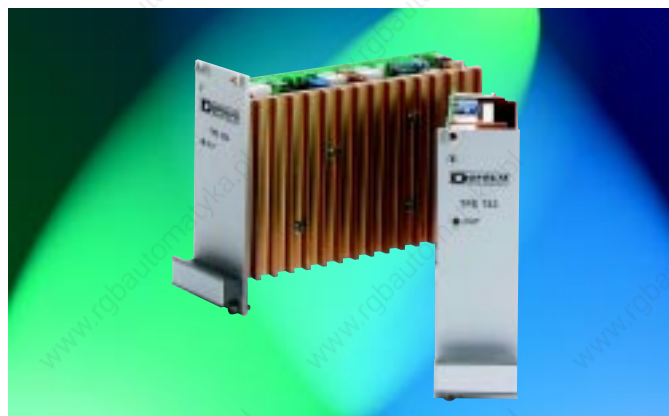
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dc-dc  
dc-dc  
dc-dc  
dc-dc  
dc-dc

# TPS Series: DC/DC-Converter for 19"-rack applications

Primary switched mode converters with side heat sinks for use in 19" subracks to DIN41494, 1-3 outputs and 100 to 250 Watts output power.

## Features

- Convection cooled
- Parallel, N+1 redundant
- Wide input range
- Safety to approvals to UL, cUL and EN60950
- Inrush current limited, BTR 2511
- High MTBF
- Hot plug modular design



TPS-Series DC-DC converter

## Ordering information

Model: TPS133, TPS264, TPS233, TPS168

### TPS-Series DC-DC Converter; 100 Watt output power

#### TPS 133 Series

| Type             | Output   | Article Nb. |
|------------------|----------|-------------|
| EA-TPS 133-24-05 | 5V/20A   | 17 120 600  |
| EA-TPS 133-24-12 | 12V/8,5A | 17 120 601  |
| EA-TPS 133-24-24 | 24V/4,5A | 17 120 602  |
| EA-TPS 133-24-48 | 48V/2,2A | 17 120 603  |
| EA-TPS 133-48-05 | 5V/20A   | 17 120 604  |
| EA-TPS 133-48-12 | 12V/8,5A | 17 120 605  |
| EA-TPS 133-48-24 | 24V/4,5A | 17 120 606  |
| EA-TPS 133-48-48 | 48V/2,2A |             |

### TPS-Serie DC-DC Converter; 125 Watt output power

#### TPS 264 Series

|                  |                                   |            |
|------------------|-----------------------------------|------------|
| EA-TPS 264-24-00 | V1: 5V/15A, V2:12V/6A, V3: 12V/3A | 17 120 610 |
| EA-TPS 264-48-00 | V1: 5V/15A, V2:12V/6A, V3: 12V/3A | 17 120 611 |

### TPS-Serie DC-DC Converter; 150 Watt output power

#### TPS 233 Series

|                   |          |            |
|-------------------|----------|------------|
| EA-TPS 233-24-05  | 5V/30A   | 17 120 620 |
| EA-TPS 233-24-12  | 12V/13A  | 17 120 621 |
| EA-TPS 233-24-15  | 15V/10A  | 17 120 622 |
| EA-TPS 233-24-24  | 24V/6,5A | 17 120 623 |
| EA-TPS 233-24-48  | 48V/3,5A | 17 120 624 |
| EA-TPS 233-48-05  | 5V/30A   | 17 120 625 |
| EA-TPS 233-48-12  | 12V/13A  | 17 120 626 |
| EA-TPS 233-48-15  | 15V/10A  | 17 120 627 |
| EA-TPS 233-48-24  | 24V/6,5A | 17 120 628 |
| EA-TPS 233-110-24 | 24V/6,5A | 17 120 629 |

### TPS-Serie DC-DC converter; 250 Watt output power

#### TPS 168 Series

|                   |         |            |
|-------------------|---------|------------|
| EA-TPS 168-24-48  | 48V/5A  | 17 120 643 |
| EA-TPS 168-48-24  | 24V/10A | 17 120 646 |
| EA-TPS 168-110-24 | 24V/10A | 17 120 648 |

## Technical Data TPS Series: TPS133, TPS264, TPS233, TPS168

### Input Data

|  |   |
|--|---|
| Input voltage DC:                                  | 24VDC (20...32V),<br>48VDC (40...75V), 110VDC (70...150VDC) |
| Inrush current limit:                              | BTR 2511  |
| Input overvoltage protection:                      | VDR   |
| Hold up time (Nominal $V_{in}$ ; 100% $I_{out}$ ): | 5-12ms  |
| Efficiency:  | typ. 80-90%   |

### Safety (Compliant with Low Voltage Directive 73/23/EEC)

|                           |                            |
|---------------------------|----------------------------|
| Isolation: Input-Output   | 2,5kVDC (1,5kVDC - TPS264) |
| Isolation: Input-Chassis  | 1,5kVDC                    |
| Isolation: Output-Chassis | 0,5kVDC                    |

### EMC (Compliant with EMC Directive 89/336/EEC)

|             |  |
|-------------|--|
| Emmissions: | EN 55022/B (0,15-30MHz); EN 55022/B (30-1000MHz) |
|-------------|--|

### Environmental

|                        |                                      |
|------------------------|--------------------------------------|
| Operating temperature: | 0°C to +70°C / Derating >55°C 40W/°C |
| Storage temperature:   | -25°C bis +85°C (-45°C bis +85°C)    |
| Relative humidity:     | max. 90% none condensing             |

### Physical

|                             |   |
|-----------------------------|---|
| Dimensions: TPS133 Eurocard | 3U x 8HP x 160<br>(40,3mm wide x 128,4mm high)                            |
| Dimensions: TPS233 Eurocard | 3U x 10HP x 160<br>(50,5mm wide x 128,4mm high)                           |
| Dimensions: TPS264 Eurocard | 3U x 14HP x 160<br>(70,8mm wide x 128,4mm high)                           |
| Dimensions: TPS168 Eurocard | 3U x 18HP x 160<br>(91,1mm wide x 128,4mm high)                           |
| Weight: TPS133              | 700g  |
| Weight: TPS233              | 900g  |
| Weight: TPS264              | 900g  |
| Weight: TPS168              | 900g  |
| Case material/finish:       | ventilated aluminium with side heat sinks.<br>DIN 41494 part 5 compatible |

DC-DC



# TPS Series: DC/DC Converter 19"-rack applications

## Output specifications

| TPS 133   | V1                       | V1                  | V1                  | V1                  |
|---|--------------------------|---------------------|---------------------|---------------------|
| Output voltage:   | <b>5V</b>                | <b>12V</b>          | <b>24V</b>          | <b>48V</b>          |
| Adjustment range:   | fixed                    |                     |                     |                     |
| Output current:   | <b>20A</b>               | <b>8,5A</b>         | <b>4,5A</b>         | <b>2,2A</b>         |
| Ripple:   | <50mV <sub>PP</sub>      | <40mV <sub>PP</sub> | <50mV <sub>PP</sub> | <50mV <sub>PP</sub> |
| Noise:  | 100mV                    |                     |                     |                     |
| Output current limit:   | 28A                      | 11A                 | 6A                  | 3,3A                |
| Switching frequency, converter type:                                    | 100kHz forward converter |                     |                     |                     |
| Overvoltage protection (OVP):   | 6,2V                     | 15V                 | 30V                 | 54V                 |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>OUT</sub>            | 0,1%                     | 0,25%               | 0,08%               | 0,08%               |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>OUT</sub> | 0,1%                     | 0,17%               | 0,30%               | 0,08%               |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :          | yes                      |                     |                     |                     |
| Temperature-coefficient/°C:   | 0,02%                    |                     |                     |                     |
| Remote SENSE max.:  | 0,5V                     |                     |                     |                     |
| Derating: above 55°C  | 4,0W/°C                  |                     |                     |                     |

| TPS264  | V1                       | V2                  | V3                 |
|---|--------------------------|---------------------|--------------------|
| Output voltage:   | <b>5V</b>                | <b>+12V</b>         | <b>-12V</b>        |
| Adjustment range:   | fixed                    |                     |                    |
| Output current:   | 15A                      | 6,0A                | 3,0A               |
| Ripple:   | 50mV <sub>PP</sub>       | 100mV <sub>PP</sub> | 75mV <sub>PP</sub> |
| Noise:  | 100mV                    | 150mV               | 100mV              |
| Output current limit:   | >18A                     | >7,5A               | >5A                |
| Switching frequency, converter type:                                    | 100kHz forward converter |                     |                    |
| Overvoltage protection (OVP):   | 6,8V                     | 13,8V               | 18V                |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>OUT</sub>            | 0,02%                    | 1,5%                | 1,25%              |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>OUT</sub> | 0,1%                     | 1,5%                | 1,25%              |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :          | yes                      |                     |                    |
| Temperature-coefficient/°C:   | 0,02%                    |                     |                    |
| Remote SENSE max.:  | 0,5V                     |                     |                    |
| Derating: above 55°C  | 5W/°C                    |                     |                    |

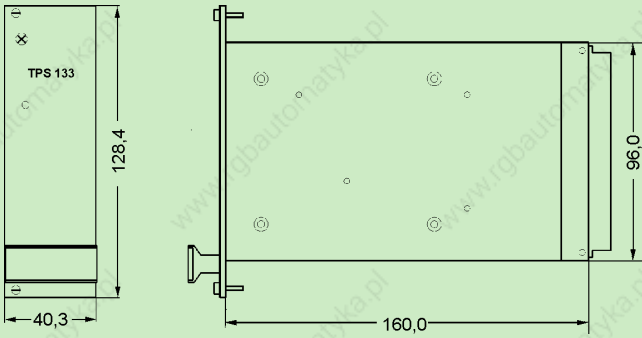
| TPS233  | V1                       | V1                  | V1                  | V1                  |
|---|--------------------------|---------------------|---------------------|---------------------|
| Output voltage:   | <b>5V</b>                | <b>12V</b>          | <b>24V</b>          | <b>48V</b>          |
| Adjustment range:   | fixed                    |                     |                     |                     |
| Output current:   | 30A                      | 13A                 | 6,5A                | 3,5A                |
| Ripple:   | <50mV <sub>PP</sub>      | <40mV <sub>PP</sub> | <50mV <sub>PP</sub> | <50mV <sub>PP</sub> |
| Noise:  | <100mV <sub>PP</sub>     |                     |                     |                     |
| Output current limit:   | 33A                      | 15,5A               | 8,5A                | 4,5A                |
| Overvoltage protection (OVP):   | 6,2V                     | 15V                 | 28V                 | 55V                 |
| Switching frequency, converter type:                                    | 100kHz forward converter |                     |                     |                     |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>OUT</sub>            | 0,6%                     | 0,17%               | 0,08%               | 0,08%               |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>OUT</sub> | 2,0%                     | 0,2%                | 0,3%                | 0,2%                |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :          | yes                      |                     |                     |                     |
| Temperature-coefficient/°C:   | 0,02%                    |                     |                     |                     |
| Remote SENSE max.:  | 0,5V                     |                     |                     |                     |
| Derating: above 55°C  | 6,0W/°C                  |                     |                     |                     |

| TPS168  | V1                        | V1                  | V1                  | V1                  |
|---|---------------------------|---------------------|---------------------|---------------------|
| Output voltage:   | <b>5V</b>                 | <b>12V</b>          | <b>24V</b>          | <b>48V</b>          |
| Adjustment range:   | fixed                     |                     |                     |                     |
| Output current:   | 40A                       | 20A                 | 10A                 | 5,0A                |
| Ripple:   | <20mV <sub>PP</sub>       | <20mV <sub>PP</sub> | <25mV <sub>PP</sub> | <25mV <sub>PP</sub> |
| Output current limit:   | 45A                       | 22A                 | 11A                 | 5,5A                |
| Noise:  | <200mV <sub>PP</sub>      |                     |                     |                     |
| Overvoltage protection (OVP):   | 6,5V                      | 16V                 | 30V                 | 65V                 |
| Switching frequency, converter type:                                    | 80kHz push-pull converter |                     |                     |                     |
| Line regulation (100% I <sub>OUT</sub> ): Δ i <sub>OUT</sub>            | 0,6%                      | 0,03%               | 0,03%               | 0,03%               |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ i <sub>OUT</sub> | 0,9%                      | 0,5%                | 0,3%                | 0,3%                |
| Powerfail-Signal (at full load) >6ms before V <sub>OUT</sub> :          | yes                       |                     |                     |                     |
| Temperature-coefficient/°C:   | 0,02%                     |                     |                     |                     |
| Remote SENSE max.:  | 0,5V                      |                     |                     |                     |
| Derating: above 55°C  | 2,5W/°C                   |                     |                     |                     |

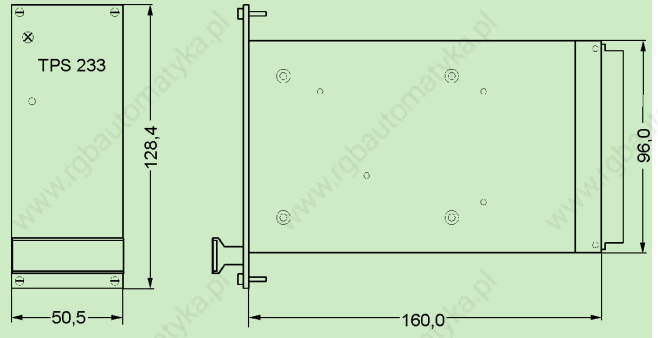
# TPS Series: DC/DC Converter 19"-rack applications

Mechanical Details (Chassis mounts available)

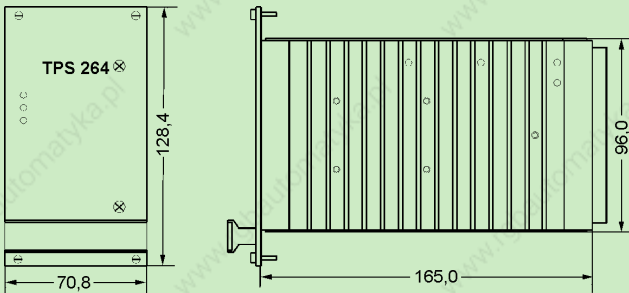
TPS 133



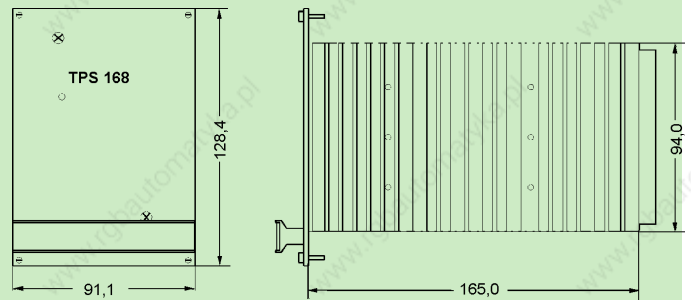
TPS 233



TPS 264

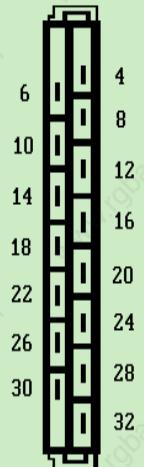


TPS 168



### Pin allocation H15-connector

| PIN | Function<br><i>TPS133</i> | Function<br><i>TPS264</i> | Function<br><i>TPS233</i> | Function<br><i>TPS168 5/12V</i> | Function<br><i>TPS168 24/48V</i> |
|-----|---------------------------|---------------------------|---------------------------|---------------------------------|----------------------------------|
| 4   | +In                       | +In                       | +In                       | +In                             | +In                              |
| 6   | -In                       | -In                       | -In                       | -In                             | -In                              |
| 8   | Powerfail C               | Powerfail                 | Powerfail C               | +In                             | +In                              |
| 10  | Powerfail E               | Powerfail                 | Powerfail E               | -In                             | -In                              |
| 12  | NC                        | +Out 3                    | NC                        | +Out                            | PWR OK                           |
| 14  | Share                     | -Out 3                    | Share                     | +Out                            | PWR OK                           |
| 16  | NC                        | +Out 2                    | NC                        | +Out                            | PWR OK                           |
| 18  | NC                        | RTN                       | NC                        | Share                           | Share                            |
| 20  | +Out                      | +Out 1                    | +Out                      | +SENSE                          | +Out                             |
| 22  | +Out                      | +Out 1                    | +Out                      | -SENSE                          | +Out                             |
| 24  | +SENSE                    | +SENSE Out 1              | +SENSE                    | -Out                            | +SENSE                           |
| 26  | -SENSE                    | +SENSE Out 1              | -SENSE                    | -Out                            | -SENSE                           |
| 28  | -Out                      | RTN 1+2                   | -Out                      | -Out                            | -Out                             |
| 30  | -Out                      | RTN Out 1+2               | -Out                      | -Out                            | -Out                             |
| 32  | GND                       | GND                       | GND                       | GND                             | GND                              |



DC-DC

# GK Series: MONOVOLT

Primary switched DC/DC-Converter for use in 19" applications to DIN41494, single output, 30 to 120 Watts output power.

### Features

- Convection cooled
- Safety according EN60950
- CE marked for compliance to EMC and Low Voltage Directives
- No minimum load required
- Remote sense
- External on/off
- Overvoltage (OVP) and short circuit protected

### Ordering information

Description: MONOVOLT GK Series; 30W output power

| Type                               | Output | Order-code  |
|------------------------------------|--------|-------------|
| <b>GK Series; 30W Output power</b> |        |             |
| GK 30-2 12VDC 3U x 8HP             | 5V/6A  | 116-010166A |
| GK 30-2 24VDC 3U x 8HP             | 5V/6A  | 116-010167J |
| GK 30-2 48VDC 3U x 8HP             | 5V/6A  | 116-010168F |

|                                    |          |             |
|------------------------------------|----------|-------------|
| <b>GK Series; 60W Output power</b> |          |             |
| GK 60-2 24VDC 3U x 8HP             | 5V/12A   | 116-010034B |
| GK 60-2 24VDC 3U x 8HP             | 12V/5A   | 116-010035K |
| GK 60-2 24VDC 3U x 8HP             | 15V/4A   | 116-010036G |
| GK 60-2 24VDC 3U x 8HP             | 24V/2,5A | 116-010037D |

|                        |          |             |
|------------------------|----------|-------------|
| GK 60-2 48VDC 3U x 8HP | 5V/12A   | 116-010038A |
| GK 60-2 48VDC 3U x 8HP | 12V/5A   | 116-010039J |
| GK 60-2 48VDC 3U x 8HP | 15V/4A   | 116-010040K |
| GK 60-2 48VDC 3U x 8HP | 24V/2,5A | 116-010041G |

|                                     |         |             |
|-------------------------------------|---------|-------------|
| <b>GK Series; 120W Output power</b> |         |             |
| GK 120 24VDC 3U x 14HP              | 5V/20A  | 116-010132C |
| GK 120 24VDC 3U x 14HP              | 12V/10A | 116-010133L |
| GK 120 24VDC 3U x 14HP              | 24V/5A  | 116-010135E |
| GK 120 48VDC 3U x 14HP              | 5V/20A  | 116-010136B |
| GK 120 48VDC 3U x 14HP              | 12V/10A | 116-010137K |
| GK 120 48VDC 3U x 14HP              | 24V/5A  | 116-010139D |

### Accessories:

|   |            |
|---|------------|
| Reduced height front panel: GK30        | 148-10012F |
| Reduced height front panel: GK60        | 148-10021E |
| Reduced height front panel: GK120       | 148-10019G |
| Mating connector coded H15 to DIN 41612 | 17-10115K  |
| Coding keys (pkt 10)                    | 17-10064F  |



GK-Series MONOVOLT Power Supplies

### Technical Data MONOVOLT GK Series

#### Input data

|  |  |
|--|--|
| Input voltage:                                     | 12VDC (9..18V), 24VDC (18..36V), 48VDC (36..72V) |
| Inrush - current limit:                            | line impedance dependent                         |
| Input overvoltage protection:                      | by thyristor crowbar                             |
| Hold up time (Nominal $V_{IN}$ ; 100% $I_{OUT}$ ): | >3ms   |
| Efficiency:  | typ. >70%  |

#### Safety (Compliant with Low Voltage Directive 73/23/EEC)

|                           |         |
|---------------------------|---------|
| Isolation: input-output   | 0,5kVDC |
| Isolation: input-chassis  | 0,5kVDC |
| Isolation: output-chassis | 0,5kVDC |

#### EMC (Compliant with EMC Directive 89/336/EEC)

|                                   |              |
|-----------------------------------|--------------|
| Emmissions:                       | EN 55022     |
| Immunity:                         | EN 50082-2   |
| Electro Static Discharge:         | EN 61000-4-2 |
| Electrical fast transients/Burst: | EN 61000-4-4 |
| RF Conducted disturbance:         | EN 50141     |
| RF Field susceptibility:          | EN 50140     |

#### Environmental

|                        |                         |
|------------------------|-------------------------|
| Operating temperature: | 0°C to +70°C            |
| Storage temperature:   | -25°C to +85°C          |
| Relative humidity:     | Non-condensing 5% - 95% |

#### Physical

Case material/finish: Clear anodised, ventilated aluminium cassette with cooling cutouts and front or rear heat sinks as applicable.  
DIN 41494 part 5 compatible

# GK Series: MONOVOLT

## Output specifications

| <b>GK30</b>  | V1                            |
|--|-------------------------------|
| Output voltage:  | <b>5V</b>                     |
| Adjustment range:  | 4,8-5,5V                      |
| Output current:  | <b>0-6A</b>                   |
| Ripple:  | <40mV <sub>PP</sub>           |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,2%                         |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,2%                         |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 1ms                           |
| Switching frequency, converter type:                                     | 85kHz forward converter       |
| Output current limit:  | >6,5A                         |
| Short circuit protection:  | continuous, automatic restart |
| Overvoltage protection (OVP):  | 6-6,7V                        |
| Temperature coefficient/°C:  | 0,02%                         |
| Remote SENSE max. <sub>NOTE</sub> :                                      | 0,5V                          |
| Derating above 55°C:   | 1W/°C above 55°C              |

| <b>GK60</b>  | V1                            | V1          | V1          | V1            |
|--|-------------------------------|-------------|-------------|---------------|
| Output voltage:  | <b>5V</b>                     | <b>12V</b>  | <b>15V</b>  | <b>24V</b>    |
| Adjustment range:  | 4,5-5,5V                      | 11-13V      | 13,5-16,5V  | 22-26V        |
| Output current:  | <b>0-12A</b>                  | <b>0-5A</b> | <b>0-4A</b> | <b>0-2,5A</b> |
| Ripple:  | <40mV <sub>PP</sub>           |             |             |               |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,3%                         | <0,2%       | <0,2%       | <0,2%         |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,2%                         |             |             |               |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 0,8ms                         | 0,5ms       | 0,5ms       | 0,5ms         |
| Switching frequency, converter type:                                     | 75kHz push-pull converter     |             |             |               |
| Output current limit:  | >12,5A                        | >5,3A       | >4,3A       | >2,7A         |
| Short circuit protection:  | continuous, automatic restart |             |             |               |
| Overvoltage protection (OVP):  | 5,5-6,0V                      | 13,2-15,0V  | 16,5-18,0V  | 26,4-30,0V    |
| Temperature coefficient/°C:  | 0,02%                         |             |             |               |
| Remote SENSE max. <sub>NOTE</sub> :                                      | 0,5V                          |             |             |               |
| Derating above 55°C:   | 2W/°C above 55°C              |             |             |               |

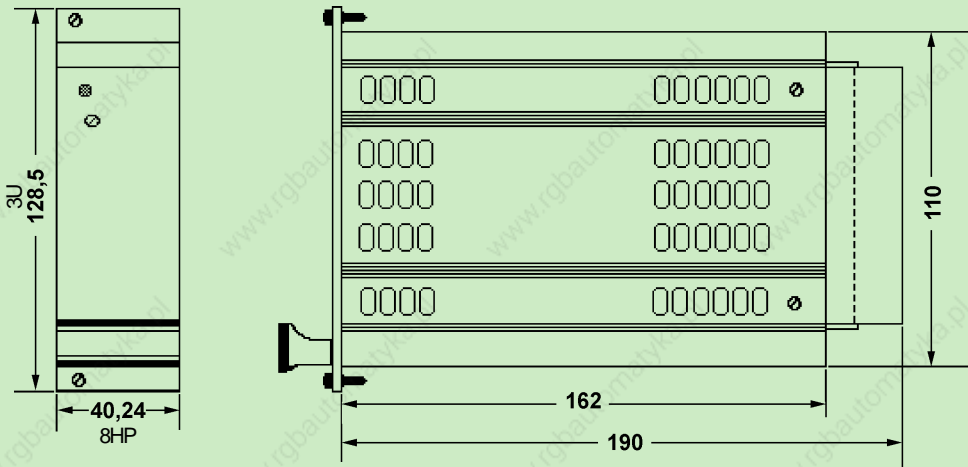
| <b>GK120</b>   | V1                            | V1           | V1          | V1          |
|--|-------------------------------|--------------|-------------|-------------|
| Output voltage:  | <b>5V</b>                     | <b>12V</b>   | <b>15V</b>  | <b>24V</b>  |
| Adjustment range:  | 4,5-5,5V                      | 10,8-13,2V   | 13,5-16,5V  | 21,6-26,4V  |
| Output current:  | <b>0-20A</b>                  | <b>0-10A</b> | <b>0-8A</b> | <b>0-5A</b> |
| Ripple:  | <40mV <sub>PP</sub>           |              |             |             |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,2%                         |              |             |             |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,2%                         |              |             |             |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 0,5ms                         |              |             |             |
| Switching frequency, converter type:                                     | 85kHz push-pull converter     |              |             |             |
| Output current limit:  | >22A                          | >11A         | >8,8A       | >5,5A       |
| Short circuit protection:  | continuous, automatic restart |              |             |             |
| Overvoltage protection (OVP):  | 5,0-7,0V                      | 12,0-16,5V   | 15,0-21,0V  | 27,0-29,0V  |
| Temperature coefficient/°C:  | 0,02%                         |              |             |             |
| Remote SENSE max. <sub>NOTE</sub> :                                      | 0,5V                          |              |             |             |
| Derating above 55°C:   | 4W/°C above 55°C              |              |             |             |



# GK Series: MONOVOLT

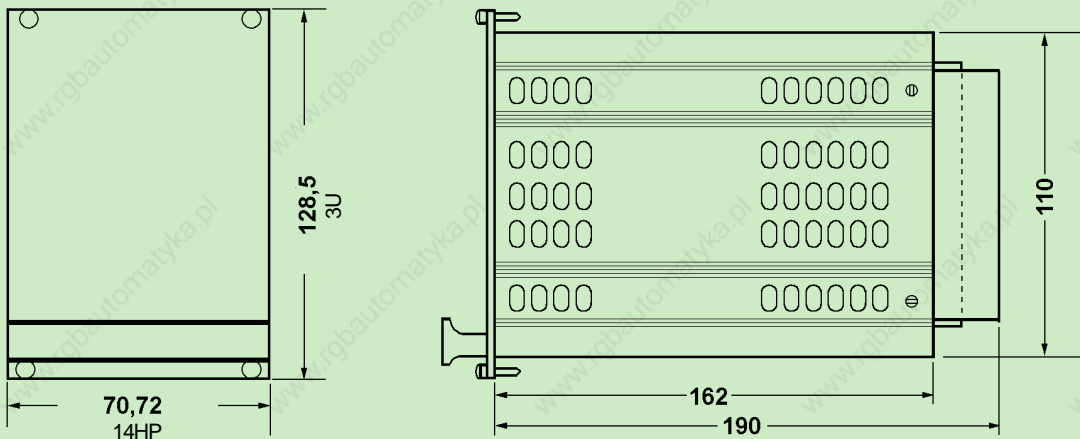
## Mechanical Details

### GK30, GK60



Weight: GK30, GK60 850g

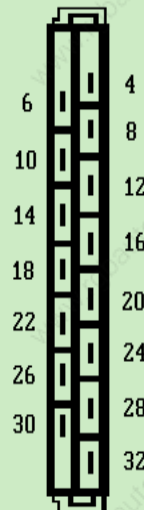
### GK120



Weight: GK120 1350g

### Pin allocation - H15 connector

| PIN | Function |            |            |
|-----|----------|------------|------------|
|     | GK30     | GK60       | GK120      |
| 4   | +Vout    | +Vout      | +Vout      |
| 6   | +Vout    | +Vout      | +Vout      |
| 8   | -Vout    | -Vout      | -Vout      |
| 10  | -Vout    | -Vout      | -Vout      |
| 12  | +SENSE   | +SENSE     | +SENSE     |
| 14  | -SENSE   | -SENSE     | -SENSE     |
| 16  | —        | —          | —          |
| 18  | —        | —          | —          |
| 20  | —        | —          | —          |
| 22  | —        | Ext on/off | Ext on/off |
| 24  | -Vin     | -Vin       | -Vin       |
| 26  | -Vin     | -Vin       | -Vin       |
| 28  | +Vin     | +Vin       | +Vin       |
| 30  | +Vin     | +Vin       | +Vin       |
| 32  | GND      | GND        | GND        |



Note: Sense lines must be connected. For maximum compensation for supply lead voltage drop they should be connected as close to the load as possible

# GK Series: BIVOLT

Primary switched DC/DC-Converter for use in 19" applications to DIN41494, single output, 30 and 60 Watts output power.

### Features

- Convection cooled
- Safety according EN60950
- CE marked for compliance to EMC and Low Voltage Directives
- No minimum load required
- Overvoltage (OVP) and short circuit protected



GK-Series BIVOLT Power Supplies

### Ordering information

**Description: BIVOLT GK30, GK60;**  
**3U x 8HP 30-60 Watt Output power**

#### GK 30 Series; 30W Output power

| Type          | Outputs    | Order-code         |
|---------------|------------|--------------------|
| GK 30-2 12VDC | ±12-15V/1A | <b>116-010170D</b> |
| GK 30-2 24VDC | ±12-15V/1A | <b>116-010171A</b> |
| GK 30-2 48VDC | ±12-15V/1A | <b>116-010172J</b> |

#### BIVOLT, GK60; 3U x 8HP 60 Watt Output power

|                |            |                    |
|----------------|------------|--------------------|
| GK 60-2A 12VDC | ±12-15V/2A | <b>116-010152F</b> |
| GK 60-2A 24VDC | ±12-15V/2A | <b>116-010153C</b> |
| GK 60-2A 48VDC | ±12-15V/2A | <b>116-010154L</b> |

### Accessories

|   |                    |
|---|--------------------|
| Reduced height front panel: GK30        | <b>148-010013C</b> |
| Reduced height front panel: GK60        | <b>148-010011J</b> |
| Mating connector coded H15 to DIN 41612 | <b>017-010115K</b> |
| Coding keys (pkt 10)                    | <b>017-010064F</b> |

### Technical Data GK Series: BIVOLT

#### Input Specification

|  |  |
|--|--|
| Input voltage:                                     | 12VDC (9...18V), 24VDC (18...36V),<br>48VDC (36...72V) |
| Inrush - current limit:                            | line impedance dependent                               |
| Input overvoltage protection:                      | by Thyristor-Crowbar                                   |
| Hold up time (Nominal $V_{in}$ ; 100% $I_{out}$ ): | >3ms   |
| Efficiency:  | typ. >60-80%   |

#### Safety (Compliant with Low Voltage Directive 73/23/EEC)

|                           |         |
|---------------------------|---------|
| Isolation: input-output   | 0,5kVDC |
| Isolation: input-chassis  | 0,5kVDC |
| Isolation: output-chassis | 0,5kVDC |

#### EMC (Compliant with EMC Directive 89/336/EEC)

|                                   |              |
|-----------------------------------|--------------|
| Emmissions:                       | EN 55022     |
| Immunity:                         | EN 50082-2   |
| Electro Static Discharge:         | EN 61000-4-2 |
| Electrical fast transients/Burst: | EN 61000-4-4 |
| RF Conducted disturbance:         | EN 50141     |
| RF Field susceptibility:          | EN 50140     |

#### Environmental

|                        |                         |
|------------------------|-------------------------|
| Operating temperature: | 0°C to +70°C            |
| Storage temperature:   | -25°C to +85°C          |
| Relative humidity:     | Non-condensing 5% - 95% |

#### Physical

Case material/finish: Clear anodised, ventilated aluminium cassette with cooling cutouts and front or rear heat sinks as applicable.  
 DIN 41494 part 5 compatible

# GK Series: BIVOLT

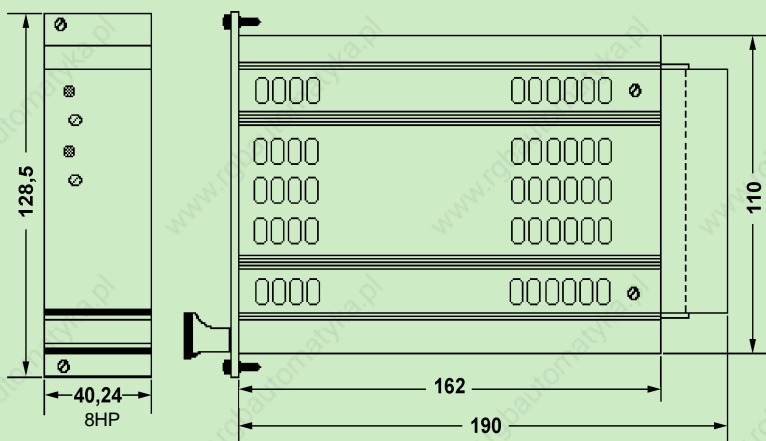
## Output specifications

| GK30   |                               | V1, V2 |
|--|-------------------------------|--------|
| Output voltage: adjustable   | <b>±12V - 15V</b>             |        |
| Output current:  | <b>±0-1A</b>                  |        |
| Ripple:  | <3mV <sub>pp</sub>            |        |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,02%                        |        |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,2%                         |        |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 10ms                          |        |
| Switching frequency, converter type:                                     | 95kHz forward converter       |        |
| Output current limit:  | >1,1A                         |        |
| Short circuit protection:  | continuous, automatic restart |        |
| Overvoltage protection (OVP):  | -                             |        |
| Temperature-Coefficient/°C:  | 0,05%                         |        |
| Derating:  | 1W/°C above 55°C              |        |

| GK60   |   | A:V1,V2 |
|--|---|---------|
| Output voltage: adjustable   | <b>±12-15V</b>                            |         |
| Output current:  | <b>±0-2A</b>                              |         |
| Ripple:  | <20mV <sub>pp</sub>                       |         |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,2%                                     |         |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,5%                                     |         |
| Transient response (10...90% I <sub>OUT</sub> ):                         | 1ms                                       |         |
| Switching frequency, converter type:                                     | 85-95kHz forward converter                |         |
| Output current limit:  | >2,2A                                     |         |
| Short circuit protection:  | continuous, automatic restart             |         |
| Overvoltage protection (OVP):  | on 5V-output only; other outputs optional |         |
| Temperature-Coefficient/°C:  | 0,05%                                     |         |
| Derating:  | 2W/°C above 55°C                          |         |

## Mechanical Details

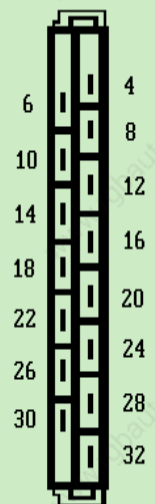
GK30, GK60



Pin Allocation H15-Connector

| PIN | Function GK30            | Function GK60 |
|-----|--------------------------|---------------|
| 4   | —                        | —             |
| 6   | —                        | —             |
| 8   | —                        | —             |
| 10  | —                        | —             |
| 12  | —                        | —             |
| 14  | —                        | —             |
| 16  | —                        | —             |
| 18  | +12-15V                  | +12-15V       |
| 20  | 0V                       | 0V            |
| 22  | -12-15V                  | -12-15V       |
| 24  | -Vin <small>Note</small> | -Vin          |
| 26  | -Vin                     | -Vin          |
| 28  | +Vin                     | +Vin          |
| 30  | +Vin                     | +Vin          |
| 32  | E                        | E             |

Note: Only on 12VDC input version



# GK Series: Trivolt

Primary switched mode DC/DC converter for use in 19" applications to DIN41494, triple outputs 60 and 120 Watts

### Features

- 3U/6U option on 120 Watt
- CE marked for compliance to EMC and Low Voltage Directives
- SENSE operation (5V output)
- Overvoltage (OVP) protection (5V output)
- Short circuit protected
- No minimum load required
- Coded H15 connector
- Standardized pinning
- Thermally optimised mechanical design
- Convection cooled



GK Series DC-DC Trivolt Plug-in power supplies

### Ordering information

Description: Trivolt GK60: 3U x 8HP  
60 Watt output

| Model       | Output                     | Order code  |
|-------------|----------------------------|-------------|
| GK60-2A 12V | V1:5V/6A, V2/3: ±12-15V/1A | 116-010097B |
| GK60-2A 24V | V1:5V/6A, V2/3: ±12-15V/1A | 116-010098K |
| GK60-2A 48V | V1:5V/6A, V2/3: ±12-15V/1A | 116-010099G |

### Accessories:

|   |             |
|---|-------------|
| Reduced height front panel: GK60        | 148-010010A |
| Mating connector coded H15 to DIN 41612 | 017-010115K |
| Coding keys (pkt 10)                    | 017-010064F |

Description: Trivolt GK120: 3U x 14HP, 6U x 8HP  
120 Watt output

| Model          | Output            | Order code  |
|----------------|-------------------|-------------|
| GK120-2 3U 24V | 5V/12A,+12-15V/2A | 116-010175L |
| GK120-2 3U 48V | 5V/12A,+12-15V/2A | 116-010176H |
| GK120-2 6U 24V | 5V/12A,+12-15V/2A | 116-010179K |
| GK120-2 6U 48V | 5V/12A,+12-15V/2A | 116-010180L |

### Accessories:

|   |             |
|---|-------------|
| Reduced height front panel: GK120 (3U)  | 148-010020H |
| Mating connector coded H15 to DIN 41612 | 017-010115K |
| Coding keys (pkt 10)                    | 017-010064F |

### Pin allocation - H15 connector

| PIN | Function  | Function |
|-----|-----------|----------|
|     | GK60      | GK120    |
| 4   | +5V       | +5V      |
| 6   | +5V       | +5V      |
| 8   | -Vout     | -Vout    |
| 10  | -Vout     | -Vout    |
| 12  | +SENSE    | +SENSE   |
| 14  | -SENSE    | -SENSE   |
| 16  | ---       | ---      |
| 18  | +12-15V   | +12-15V  |
| 20  | 0V        | 0V       |
| 22  | -12-15V   | -12-15V  |
| 24  | -Vin Note | ---      |
| 26  | -Vin      | -Vin     |
| 28  | +Vin      | +Vin     |
| 30  | +Vin      | +Vin     |
| 32  | E         | E        |

Note: Only on 12VDC input version

### Technical Data GK Series: Trivolt

#### Input specification

|  |                                |
|--|--------------------------------|
| Input voltage:   | 12VDC, 24VDC, 48VDC            |
| Inrush surge current limitation:                                 | line input impedance dependent |
| Input overvoltage protection:                                    | by thyristor crowbar           |
| Hold up time (Nominal V <sub>IN</sub> ; 100% I <sub>OUT</sub> ): | >3ms                           |
| Efficiency:  | typ. >70-75%                   |

#### Safety (Compliant with Low Voltage Directive 73/23/EEC)

|                           |         |
|---------------------------|---------|
| Isolation: input-output   | 0,5kVDC |
| Isolation: input-chassis  | 0,5kVDC |
| Isolation: output-chassis | 0,5kVDC |

#### EMC (Compliant with EMC Directive 89/336/EEC)

|                                   |              |
|-----------------------------------|--------------|
| Emmissions:                       | EN 55022     |
| Immunity:                         | EN 50082-2   |
| Electro Static Discharge:         | EN 61000-4-2 |
| Electrical fast transients/Burst: | EN 61000-4-4 |
| RF Conducted disturbance:         | EN 50141     |
| RF Field susceptibility:          | EN 50140     |

#### Environmental

|                        |                         |
|------------------------|-------------------------|
| Operating temperature: | 0°C to +70°C            |
| Storage temperature:   | -25°C to +85°C          |
| Relative humidity:     | Non-condensing 5% - 95% |

#### Physical

Case material/finish: Clear anodised, ventilated aluminium cassette with cooling cutouts and front or rear heat sinks as applicable.  
DIN 41494 part 5 compatible





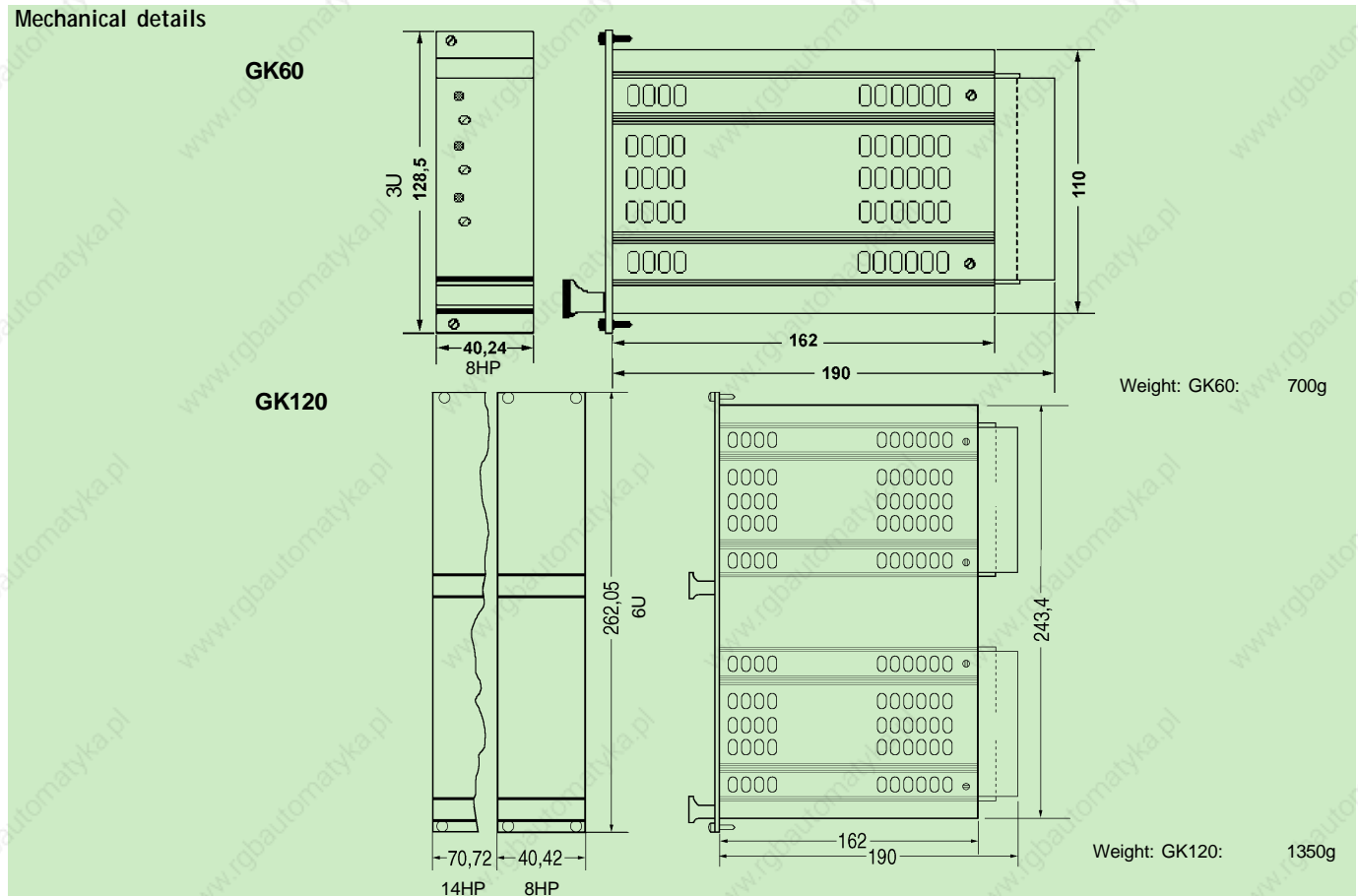
# GK Series: Trivolt

## Output specification

| GK60   | V1                            | V2/3               |
|--|-------------------------------|--------------------|
| Output voltage:  | <b>5V</b>                     | <b>±12-15V</b>     |
| Output adjustment range:   | 4,5-5,5V                      | -                  |
| Output current:  | <b>0-6A</b>                   | <b>±0-1A</b>       |
| Ripple:  | <40mV <sub>PP</sub>           | <3mV <sub>PP</sub> |
| Line regulation (100% I <sub>OUT</sub> ): iV <sub>OUT</sub>            | <0,2%                         | <0,02%             |
| Load regulation static (10...90% I <sub>OUT</sub> ): iV <sub>OUT</sub> | <0,2%                         | <0,2%              |
| Transient response (10...90% I <sub>OUT</sub> ):                       | 1ms                           | 10ms               |
| Switching frequency, converter type:                                   | 85-95kHz forward converter    |                    |
| Current limit:   | >6,5A                         | >1,1A              |
| Short circuit protection:  | continuous, automatic restart |                    |
| Overvoltage protection (OVP):  | 6-6,7V                        | -                  |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :         | <4,8V                         | -                  |
| Temperature coefficient/°C:  | 0,02%                         |                    |
| Voltage compensation with SENSE max. <sub>NOTE1</sub> :                | 0,5V                          | -                  |
| Derating:  | 2W/°C above 55°C              |                    |

| GK120  | V1                                   | V2,V3               |
|--|--------------------------------------|---------------------|
| Output voltage:  | <b>5V</b>                            | <b>±12-15V</b>      |
| Output adjustment range:   | 4,5-5,5V                             | -                   |
| Output current:  | <b>0-12A</b>                         | <b>0-2A</b>         |
| Ripple:  | <40mV <sub>PP</sub>                  | <20mV <sub>PP</sub> |
| Line regulation (100% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub>            | <0,2%                                |                     |
| Load regulation static (10...90% I <sub>OUT</sub> ): Δ iV <sub>OUT</sub> | <0,2%                                |                     |
| Transient response (10...90% I <sub>OUT</sub> ):                         | <0,2ms                               | <0,5ms              |
| Switching frequency, converter type:                                     | 75-95kHz push-pull forward converter |                     |
| Current limit:   | >12,5A                               | >2,2A               |
| Short circuit protection:  | continuous, automatic restart        |                     |
| Overvoltage protection (OVP):  | 5,5-6,0V                             | -                   |
| Powerfail Signal (at full load) >6ms before V <sub>OUT</sub> :           | <4,8V                                | -                   |
| Temperature coefficient/°C:  | 0,05%                                |                     |
| Voltage compensation with SENSE max. <sub>NOTE1</sub> :                  | 0,5V                                 | -                   |
| Derating:  | 4W/°C above 55°C                     |                     |

## Mechanical details



### Custom Power Supplies



ac-dc  
dc-dc  
ac-dc  
dc-dc  
ac-dc  
dc-dc  
ac-dc  
dc-dc  
ac-dc  
dc-dc  
ac-dc  
dc-dc

DC-DC AC-DC

## Custom Power Supplies

VERO + Danica has established itself as a major supplier of custom Euromodular power supplies.

Customisation essentially falls into two areas;

- Modified standard units
- Fully customised units

Modified standard product can be a simple change to a front panel to a variation in the output configuration. Fully customised solutions start with the fundamental design and provide a cost-optimised product providing exactly the power and features required by the end-user.

**Design** solutions for active current share, N+1 redundancy including "hot-swap" and synchronisation of switching elements within the power supply and its partners are featured in design programs as a means of limiting the emissions spectrum. VERO + Danica sees benefits in increasing the switching frequency of its product range, improving power density.

**Computer Aided Design** and circuit simulation systems are linked directly to drilling and routing machines. This combination of technologies allows high quality prototype PCBs to be produced within a few hours, greatly reducing the time required to produce the "first off" unit.

VERO + Danica tests each custom design with a **thermal imaging** system. This allows engineers to determine the areas of the power supply that would benefit from additional or improved cooling and to amend the unit at prototype stage.

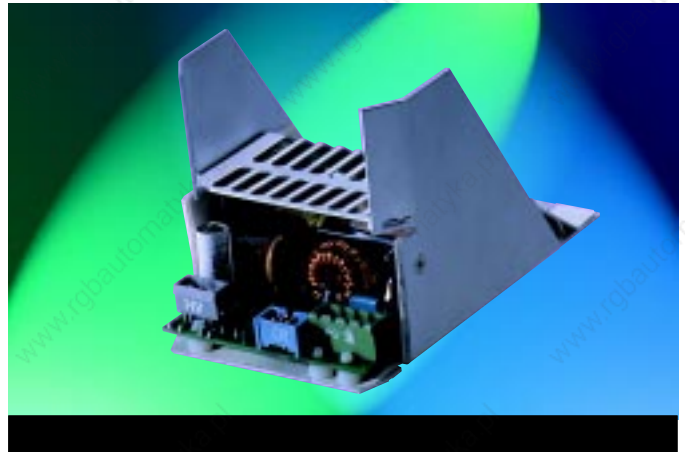
**High voltage and earth continuity testing and burn-in** facilities are custom systems, designed by VERO + Danica. Final test is centred around NH Research Powertest 8100i and 8105i auto-testers. All of these facilities are computer controlled, can include customer's own profiles, and are linked into the main product database.

**Just-In-Time Manufacturing** techniques are employed to improve delivery times and maintain even stricter control of manufacturing quality. Within VERO + Danica the adoption of J.I.T. ensures that the build-to-delivery time is kept to an absolute minimum, by eliminating manual production control procedures.

**European Union EMC Directive #83/336/EEC** places responsibility on OEMs to ensure that their apparatus or equipment complies with the requirements of European legislation.

As a responsible company VERO + Danica believes that it has an obligation as the manufacturer of product which, although a component part, contributes to the overall emissions of a system. To ensure that these emissions are minimised VERO + Danica will work with OEMs to provide the optimum solution. VERO + Danica has invested significant resource in ensuring that its products not only meet, but exceed, the requirements of the European laws, and compliance statements are available on request.

**VERO + Danica has customers in all market sectors. Most significantly in the telecommunications and railway industries and this is illustrated in greater detail on the following pages.**





## Power Supplies for Telecom - Applications

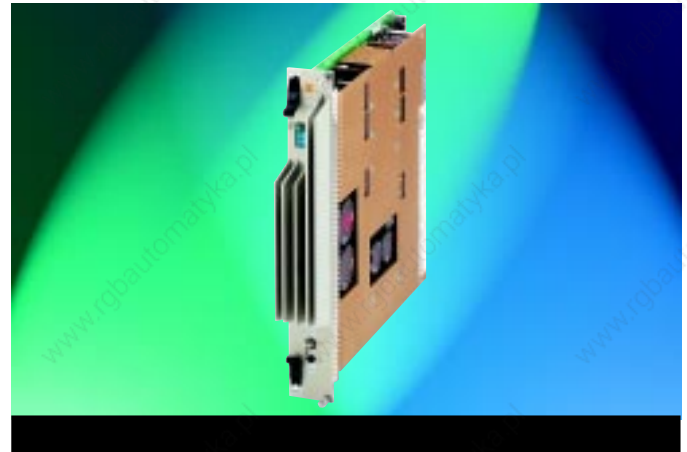
The strength of EA VERO + Danica is not limited to any particular type of unit.

Both AC and DC inputs with single and multiple outputs are part of the product range in production.

Many of the designs offer features not normally found in standard solutions. For AC inputs power factor correction is generally standardised to ensure compliance with pending harmonic correction legislation. DC input units are compliant with worldwide telecoms input specifications.

Many outputs are current sharing or N+1 configuration with converter synchronisation between units. Output alarms and voltage start-up sequencing are also available.

Integral cooling, which can also contribute to the overall thermal management of a system, can be incorporated.



The photograph (top right), depicts a 48VDC input, triple output power supply with mechanical latching to prevent accidental removal of the unit when in a "live" environment.

The second photograph shows a 700Watt, power factor corrected AC-DC unit with five outputs, any of which can be accessed from the front or rear of the unit as required.



The third photograph illustrates a 1000 Watt DC-DC converter with six outputs, power sharing and synchronised switching for cellular communications base stations.



### MONOVOLT GC75-R

Primary switched mode 75W DC-DC power supply for redundant systems, optional 24 or 48VDC input.

#### Features

- Active load sharing for redundant systems
- Parallel operation
- Integrated decoupling diodes for hot swap
- Front heat sink for optimum thermal performance
- Thermal overvoltage protection
- Redundant feed possible
- Safety to EN60950, UL1950, CSA22.2/950
- Emissions to EN50082-2, EN50081-1

| Type      | Input          | Output | Dimensions       |
|-----------|----------------|--------|------------------|
| EA-GC75-R | 24VDC or 48VDC | 5V/15A | 3U x 8HP x 160mm |



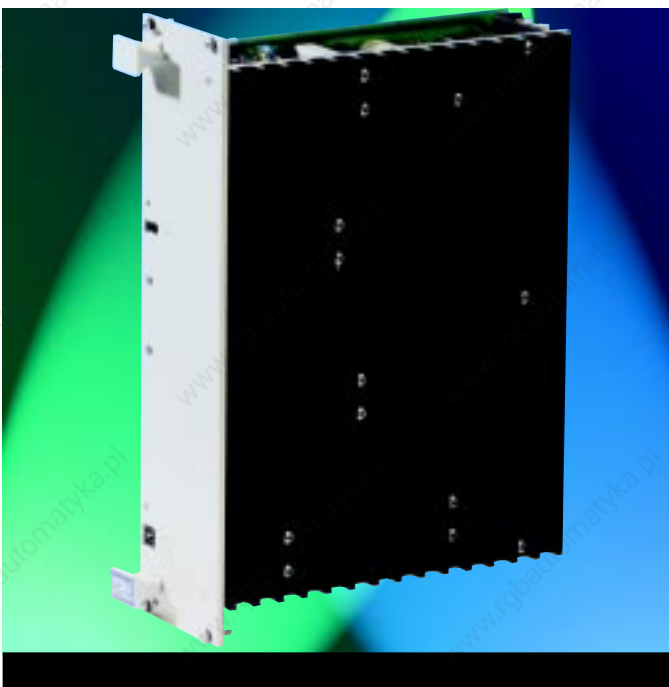


## Power supplies for railway applications



**Primary switched mode power supplies for railway applications.**  
**Versions suitable for 19" applications or chassis mounting.**

These power supplies are specially designed for use in rolling stock and railway applications. These units operate from either 24V or 110V DC input and have been extensively tested in accordance with the anticipated harsh environmental conditions possible in applications.



The power supplies are manufactured and tested to railway standard BN411002 (May 1996) and EN50155 (VDE 0115, part 200). To assure long term reliability, temperatures of individual components and mechanical hot spots have been tested, monitored and reduced. (Part stress analysis)

### EMC

Electro magnetic compatibility (EMC) is an important aspect of designing a system. In order to get approval for the complete system, it is easier if all the component parts are individually approved. All power supplies are tested by independent, accredited laboratories. Diced testing during the development of the power supplies ensures that the production units meet the relevant specifications.



The power supplies for railway applications are developed and specified predominantly to EMI 50121-3-2 (VDE 0115, Part 121-3-2) with regard to EMC. These standards contain:

- Emission in accordance with: EN 55011
- Resistance in accordance with: EN 61000-4-2 (ESD)
  - EN 61000-4-4 (Burst)
  - EN 61000-4-5 (Surge)
- EMI50141 (RF admission)
- EMI 50140 (RF emission)

# Railway application power supplies: Monovolt, Bivolt, Trivolt

Suitable for 19" applications for chassis mount, 1-3 output voltages and 60 - 500Watts output

## Features

- #
- Input filter with suppressor diodes
- Reverse input voltage protection
- Sensor connections
- Wide operating temperature range, typically -40°C to +85°C
- Input undervoltage switch-off
- DC Good signal

# All listed features are typical of the range and not specific to any particular unit. Please contact EA for detailed information



GB60 MONOVOLT/BIVOLT

## Technical Data: Monovolt, Bivolt, Trivolt

### Input specification

|                |                  |
|----------------|------------------|
| Input voltage: | 24VDC or 110VDC  |
| Efficiency:    | typ. >75% - >80% |

### Safety

|         |                                       |
|---------|---------------------------------------|
| Safety: | in accordance with EN50155, or better |
|---------|---------------------------------------|

### EMC

|            |                                  |
|------------|----------------------------------|
| Emissions: | in accordance with ENV 50121-3-2 |
|------------|----------------------------------|

### Physical

|             |                          |
|-------------|--------------------------|
| Dimensions: | see ordering information |
|-------------|--------------------------|

### Environmental

|                                      |                                 |
|--------------------------------------|---------------------------------|
| Operating temperature: typically     | -40°C to +85°C                  |
| Storage temperature: typically       | -50°C to +100°C                 |
| Vibration, oscillation, environment: | certified to BN411002, EN 50155 |



GK80 TRIVOLT



GB500 MONOVOLT

## Ordering information

**Description:** Railway application power supplies. For detailed specifications, prices and minimum order quantities contact Elektro-Automatik

| Type            | Input  | Tolerance    | Output         | Mechanics                             |
|-----------------|--------|--------------|----------------|---------------------------------------|
| Monovolt GB60#  | 24VDC  | 14,4-51VDC   | 5V/12A         | 3U x 9HP x 160mm - plug-in            |
| Monovolt GB60#  | 110VDC | 77-138VDC    | 5V/12A         | 3U x 9HP x 160mm - plug-in            |
| Monovolt GB100# | 24VDC  | 14,4-51VDC   | 24V/4.2A       | 3U x 12HP x 160mm - plug-in           |
| Monovolt GB100# | 110VDC | 40-154VDC    | 24V/4.2A       | 3U x 12HP x 160mm - plug-in           |
| Monovolt GB150# | 24VDC  | 16,8-45,2VDC | 24V/6.3A       | 110mm x 172mm x 100mm - wall mounting |
| Monovolt GB150# | 110VDC | 50,4-138VDC  | 24V/6.3A       | 110mm x 172mm x 100mm - wall mounting |
| Monovolt GB500# | 110VDC | 77-143VDC    | 24V/21A        | 225mm x 200mm x 90mm - wall mounting  |
| Bivolt GB60#    | 24VDC  | 14,4-51VDC   | ±15V/2A        | 3U x 9HP x 160mm - plug-in            |
| Bivolt GB60#    | 110VDC | 40-154VDC    | ±15V/2A        | 3U x 9HP x 160mm - plug-in            |
| Trivolt GK80    | 24VDC  | 16-32VDC     | 5V/4A;±15V/2A  | 6U x 8HP x 160mm - plug-in            |
| Trivolt GK80    | 110VDC | 77-143VDC    | 5V/4A;±15V/2A  | 6U x 8HP x 160mm - plug-in            |
| Trivolt GB135   | 110VDC | 77-143VDC    | 5V/15A;±15V/2A | 6U x 12HP x 160mm - plug-in           |



## Development for optimum customer benefit

The development division has a very high priority inside this dynamic firm. As a result EA systems have always represented power technology at the cutting edge.

All EMC measurements (electromagnetic compatibility) are carried out in house. All products carry the **CE** mark.

Our experienced design and development team reacts quickly to assist customers in the application of our power conversion equipment.

Among the special developments, for example, are devices for power feed back into the mains network, switch mode laboratory power supplies from 320W up to 24kW, switching inverters up to 2500 VA (capable for parallel operation) and 19" power supply modules up to 3000 Watt for the telecommunications sector.

Indoor and Outdoor DC power systems for the telecom sector. The feature shared by all these developments is the optimum power utilisation due to high efficiency.



CAD Workstation



Final test before production start



Electromagnetic compatibility test (EMC)

## The complete EA power supply programme...

EA's extensive range of standard power conversion products enables us to provide the optimum solution to a wide range of applications and environments. The diversity and quality of the portfolio being unrivalled nationally or internationally.

Dealing directly with the design source we are able to offer our customers in depth technical advise and modified standards where required. Complete power systems including control, monitoring, distribution and battery back up are a standard service.

Dedicated production teams and flexible operations enable EA where required to guarantee short production lead-times, even on custom low volume runs.



Battery Back-Up System for Telecommunications units

- Low Cost and Universal Power Supplies
- Standard Laboratory Power Supplies
- Special - Laboratory Power Supplies
- High Performance Power Supplies
- IEEE-488 and CAN-BUS Interfaces
- Uninterruptible Power Supply units
- Rackmount power supplies, Open Frame, 19" and modules
- DC/DC converter
- Battery chargers
- DC/AC inverter
- AC-sources and high voltage power supplies
- DC-Back-Up Systems for telecommunications units
- Electronic loads with mains feedback



Primary switching laboratory power supply



Low Cost laboratory power supply series EA-PS 2000



## ...for the following areas of application

- Industry
- Laboratories
- Research institutes
- Regenerative Energy
- Telecommunications
- Laser technology
- Public services
- Universities
- Automotive industry
- Medical technology
- Workshops
- Office applications



Primary switched laboratory power supply series 9000 up to 24kW



Laboratory power supplies series 7000A i.e. for school applications



DC - AC Sine-wave inverter 2500VA



# THE COMPLETE POWER SUPPLY PROGRAM

## LABORATORY AND FIXED VOLTAGE POWER SUPPLIES

- LINEAR REGULATED, 80W TO 32kW
- PRIMARY SWITCHED, 320W TO 24kW
- OUTPUT UP TO 12kV
- OUTPUT CURRENT UP TO 2000A
- BENCH, EUROMODULE- OR 19"-VERSIONS

## CHASSIS MOUNT POWER SUPPLIES

- LINEAR REGULATED, 5W TO 540W
- PRIMARY SWITCHED, 12W TO 12000W
- OUTPUT: 5V, 12V, 15V, 24V, 48V and 60V
- OUTPUT CURRENT UP TO 250A
- 19"-MODULES, CHASSIS or DIN RAIL MOUNTING

## VARIABLE AC POWER SOURCES

- LINEAR BROADBAND POWER STAGE
- HIGH AND LOW VOLTAGES
- 500VA TO 2000VA
- OUTPUT: 6V TO 10000V
- OUTPUT CURRENT 50mA TO 320A

## POWER SUPPLIES FOR TELECOMMUNICATION EQUIPMENT

- FROM 150W TO 8kW
- BACK-UP SYSTEMS FROM 5kW TO 24kW
- AC - DC INVERTER, 3/6U from 60W to 2750W
- DC - DC CONVERTER, 3/6U from 50W to 500W
- OUTPUT CURRENT UP TO 600A

## DC-AC SQUARE AND SINE WAVE INVERTER

- 150VA to 5kVA, 19"- RACK, BENCH  
and CHASSIS MOUNT VERSIONS
- DC INPUT 11...60V
- SUPERVISION FUNCTIONS
- PARALLEL OPERATION for  
REDUNDANT SYSTEMS

## ELECTRONIC LOAD WITH MAINS FEED BACK

- 2000W
- DC INPUT VOLTAGE 3...60V
- APPLICATIONS:  
BATTERY CAPACITY TESTS  
BURN - IN TEST  
SOLAR APPLICATIONS
- CONSTANT CURRENT  
CONSTANT RESISTANCE  
CONSTANT POWER
- MAINS FEED BACK

## IEEE-488.2 RS232 INTERFACES RS 232 - CAN - BUS INTERFACES

- DIGITAL CONTROL UNIT
- CONTROL OF POWER SUPPLIES



# Additional products

**Complete Back-up Systems  
Indoor & outdoor  
For telecom applications  
0,1kW to 24kW with internal  
or external batteries**



**Back-up Systems up to  
24kW, Indoor and outdoor**

**19" AC-DC systems 6U, up to 9kW**



**6U module  
48V/1800W**



**Ask for our "TELECOM" catalogue!**

## THE COMPLETE POWER SUPPLY PROGRAM

**Laboratory Power Supply 80W to 34kW  
Fixed Voltage Power Supplies 20-34kW  
High Voltage Power Supplies  
AC-Voltage sources to 2kW  
DC-AC Inverter 100W to 4kVA  
Electronic Loads**

**Laboratory Power Supply  
Series 2000, 80 + 160W**



**Laboratory Power Supply  
Series 9000, 320 to 1300W**



**Laboratory Power Supply  
Series 9000, 2kW to 9kW**



**Ask for our catalogue "The Complete Power Supply Program"!**

## Switched mode power supplies

**AC/DC power supplies 25 to 500W  
1 - 4 outputs with PFC  
Wide input voltage range 88...264VAC**

**DC/DC converters 25 to 150 W  
Input voltage range 19-370VDC**

**Chassis mount & open frame versions**



**240W  
with PFC**



**500W  
with PFC**

**Ask for our "Switching Power Supplies" catalogue!**

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