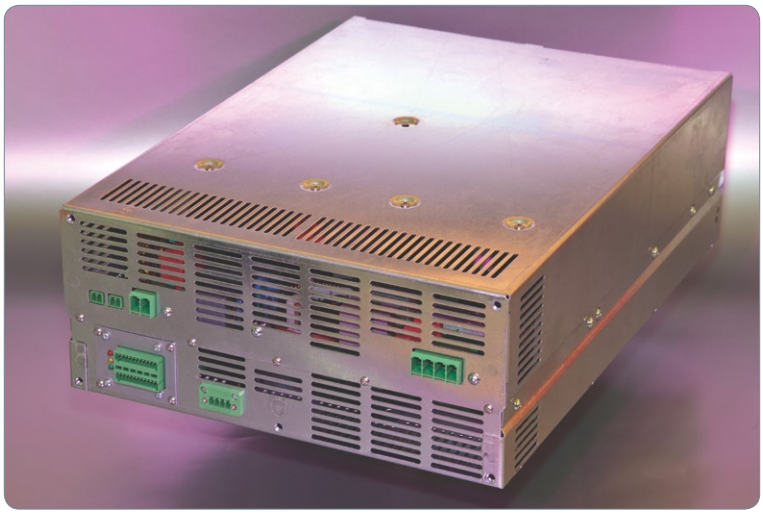
2400W - 5000W „Unified DC“ Power Supplies

Datasheet

redline TECHNOLOGIES

Versatile range of variable output switch-mode power supply with flexible interface options, identical interface and behaviour across all models



Shortform Data

property	value	unit
output current	6 - 100	A
output voltage	50 - 400	V
output power	2500 - 5000	W
mains voltage	230 or 3x 400	V_{ac}

Applications

- capacitor bank recharger
- battery charge
- RF generator supply
- electromagnets
- electroplating
- welding
- conditioning
- electrodeionization (EDI)
- high power laser diode driver
- preregulator for linear laser diode driver

Benefits

- identical interfaces to all supplies
- same behaviour of all models
- extremely fast regulation
- high speed current limiting
- full digital control
- modular platform for custom models

Your Task

Your industrial processes need power. Electrical power. Controlled power. Power to generate heat, to galvanize, to weld, to drive lamps or lasers, to generate plasma, to recharge capaitors. The power applied needs to be tightly controlled.

You need full control of the power, voltage or current that should be applied at a given time. In case of abnormal situations you need to limit or cut off the power. To supply a stable voltage the power supply must be able to vary its output current very quickly.

To scale your processes or to adapt to emerging needs you need a range of power supplies that can scale both in output voltage and power.

Our Solution

The „Unified DC" range of power supplies is a series of models with voltage levels used in industrial processing. Currently we offer 2400W and 5000W models. The modular platform allows for custom specific models, also with less and with higher power.

All power supplies across the range have identical timing characteristics. They also have identical interfaces and protocols making it easy to scale your application.

This series of power supplies is the ideal choice for driving volatile loads. The power supply becomes extremely robust because any overload condition that may damage the unit or your load is inherently avoided.

The compact design and the fully enclosed construction makes integration in your project a simple task. The cooling is fully internal. Just mount the power supply inside your enclosure on any flat surface, make the electrical connection and power up!

The dimensions of the power supplies are carefully chosen. You can mount them inside 19 inch enclosures - together with your own electronics - without wasting space. Well dimensioned power semiconductors result in a low operating temperature and a high reliability.

Function

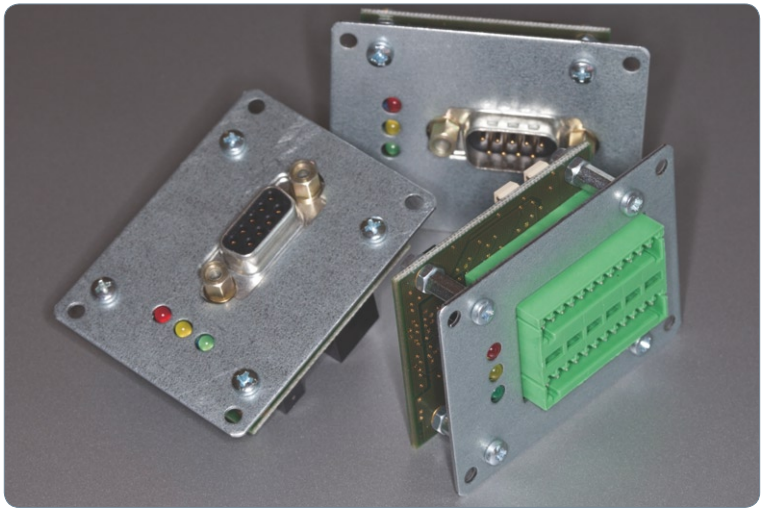
You can set the desired values for output voltage, current or power or a combination therof.

A special construction of the inverter circuit avoids any restriction on the rate of current variation. This is true although an isolating transformer is used. Output voltage and current are controlled on a pulse-by-pulse basis. The regulation happens without delay - and reaction to overvoltage or overcurrent at the output is immediate. There is also no restriction on the repetition rate of overload or short conditions at the output.

An active soft start circuit avoids excessive inrush current when the mains voltage is applied. An active power factor correction severely reduces harmonics and blind currents.

A digital processor core controls all of the operation of the power supply. All operational parameters and adjustments are stored in memory. Thus there are no trimmers which might degrade or be manipulated by the end user.

The output voltage is controlled from 0 to 100% by the analog or digital interface. A separate interlock input enables emergency turn-off of the power supply.



RS-232, CAN, Analog-U interfaces (from left to right)

All models of the „Unified DC“ range of power supplies all have an exchangeable interface. You are free to change the interface of your choice later just by exchanging the plug-in module.

All interfaces have a common ground that is isolated from the power supply outputs.

Select among the following options. If you do not find the interface of your choice, we are happy to offer customer-specific interfaces on request.

- Analog voltage 0-10Vdc, isolated
- Analog current loop 4-20mA
- EIA-232C (RS232C)
- CAN

Usage

The power supplies are intended for use inside cabinets or other enclosures. They are **not** usable as tabletop units without additional enclosure.

The output voltages and stored energy of the power supplies have dangerous levels. In your application any component leading the output voltage must be properly insulated to avoid contact to the human body.

A mains filter is built in. Depending on the property and length of your mains connection and on your particular requirements an additional filter might be required to meet the desired interference level.

Although the power supplies are very quick-acting they cannot be used as pulsed power supplies without an additional intermediate capacitor bank. If you plan to use the power supplies on pulsating loads that draw repeated current that exeeds the nominal output current you have to insert an intermediate storage capacitor bank. Otherwise the life expectancy of the capacitors inside the power supply is severely reduced.

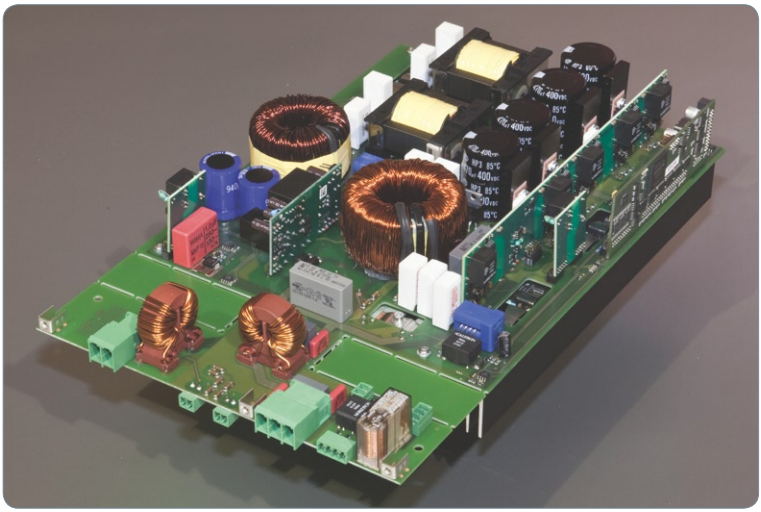
Options

The digital processor core can implement custom regulation schemes, such as power, current or voltage ramps, reaction to special load conditions or custom startup sequences.

Voltages outside or in between the ranges shown are available on request.

5kW supplies are also available with water-cooling on request.

Interfaces not listed may be added on request.



2400W mainboard

Specifications

The power supplies are specified according to EN61024-6.

Standards	number	name
specification	EN61024-7:2007	low-voltage power supplies
CE marking	93/68/EWG	
EMC general	2004/108/EG	
EMC emission	EN55011	industrial appliances
EMC immunity	EN55011	industrial appliances
electrical safety	2006/95/EG	low voltage directive
electrical safety	EN60950-1:2006	information technology
electrical safety	EN61010-1	laboratory equipment

Operating Range	class	min	typ	max	unit
output voltage		0		(1)	V
output current		0		(1)	A
output power	A..E	0		(1)	W

(1) Versions with different output ratings are available, see order codes.

Safety Requirements	class
protection category	I
protection class	IP20
overvoltage category	II
pollution category	2

Environment	class	min	typ	max	unit
ambient operating temperature	EB	0		70	°C
ambient operating temperature at full power	EE	0		50	°C
power derating above 50°C			2.5		%/K
ambient storage temperature		-10		70	°C
ambient humidity, 5..50°C non-condensing		30		80	%
humidty derating above 50°C			1		%/K
operating altitude				2000	m MSL

Mains	class	min	typ	max	unit
mains voltage 2400W single phase mains voltage 5000W three phase	A..B	180 3x 340	230 3x 400	265 3x 460	V_{rms}
mains frequency		48		63	Hz

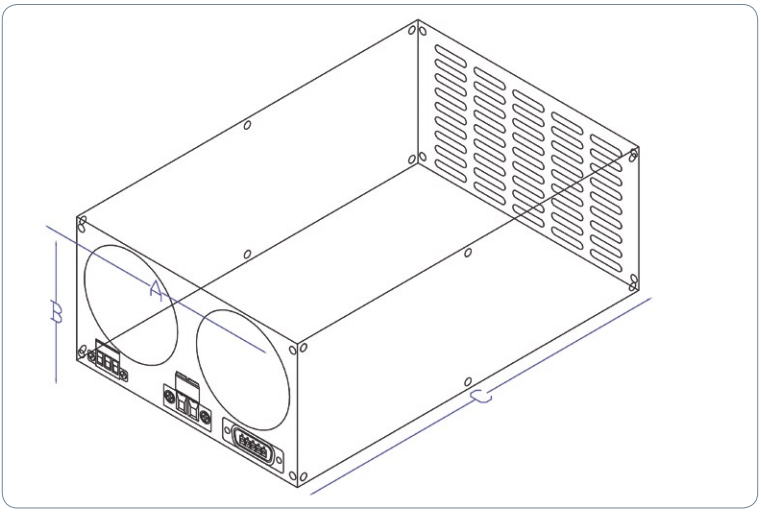
Electrical Properties	class	min	typ	max	unit
time constant of output current			50		µs
time constant of output voltage			5		ms
modulation frequency of output voltage				20	Hz
line regulation	A			0.1	%
load regulation	A			0.2	%
load range	A	0		100	%
initial voltage tolerance				0.5	%
voltage setting range		0		100	%
voltage setting resolution			0.25		%
ripple voltage (3) - at mains frequency - at switching frequency - full range 0-30MHz			 0.25 0.5 TBD		rms %
mutual regulation		N/A			
temperature coefficient	A			0.01	%/K
mains voltage gap	D		1		ms
startup time	F			5	s
turn-on voltage overshoot	B			1	%
reaction to load current variation - voltage divergence - recovery time - load variation	 D A A			 20 1 100	 % ms %
voltage undershoot on load change	D				
series operation			N/A		
parallel operation			N/A		

(*3) Timing and ripple vary with load. The values shown assume full load.

Remote Programming	class	min	typ	max	unit
analog programming (option) - voltage programming U or I - current programming U or I	 B B		 10 6.25		 %/V %/mA
digital programming - RS232 (option) - CAN (option)	C				

Dimensions (4)(5)	class	width (A)	height (B)	depth (C)	unit
2400W models		220	83	340	mm
5000W models		300	128	420	mm

(4) Airflow is in the depth axis, air inlet is at the connector side.

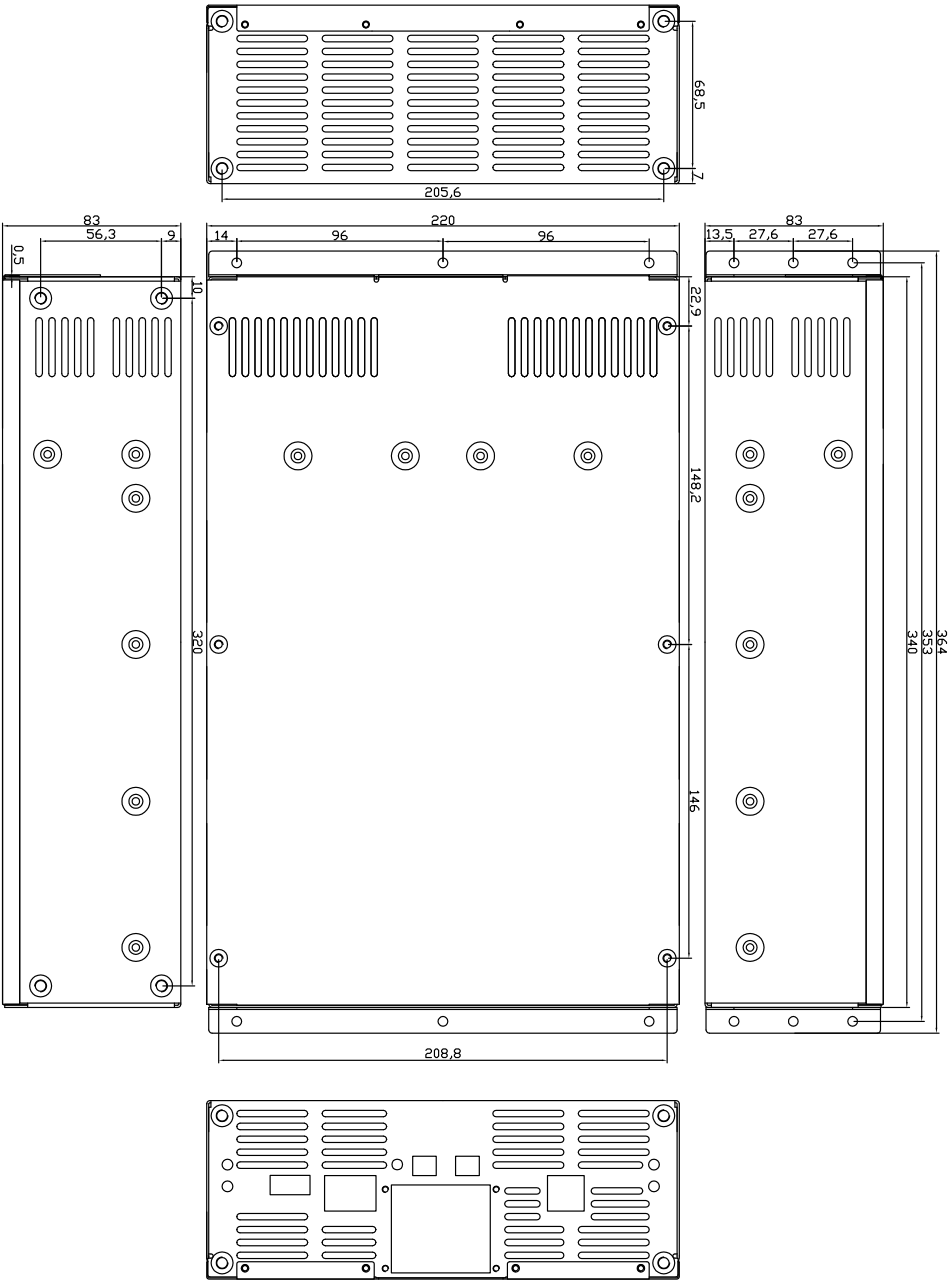


Order Code

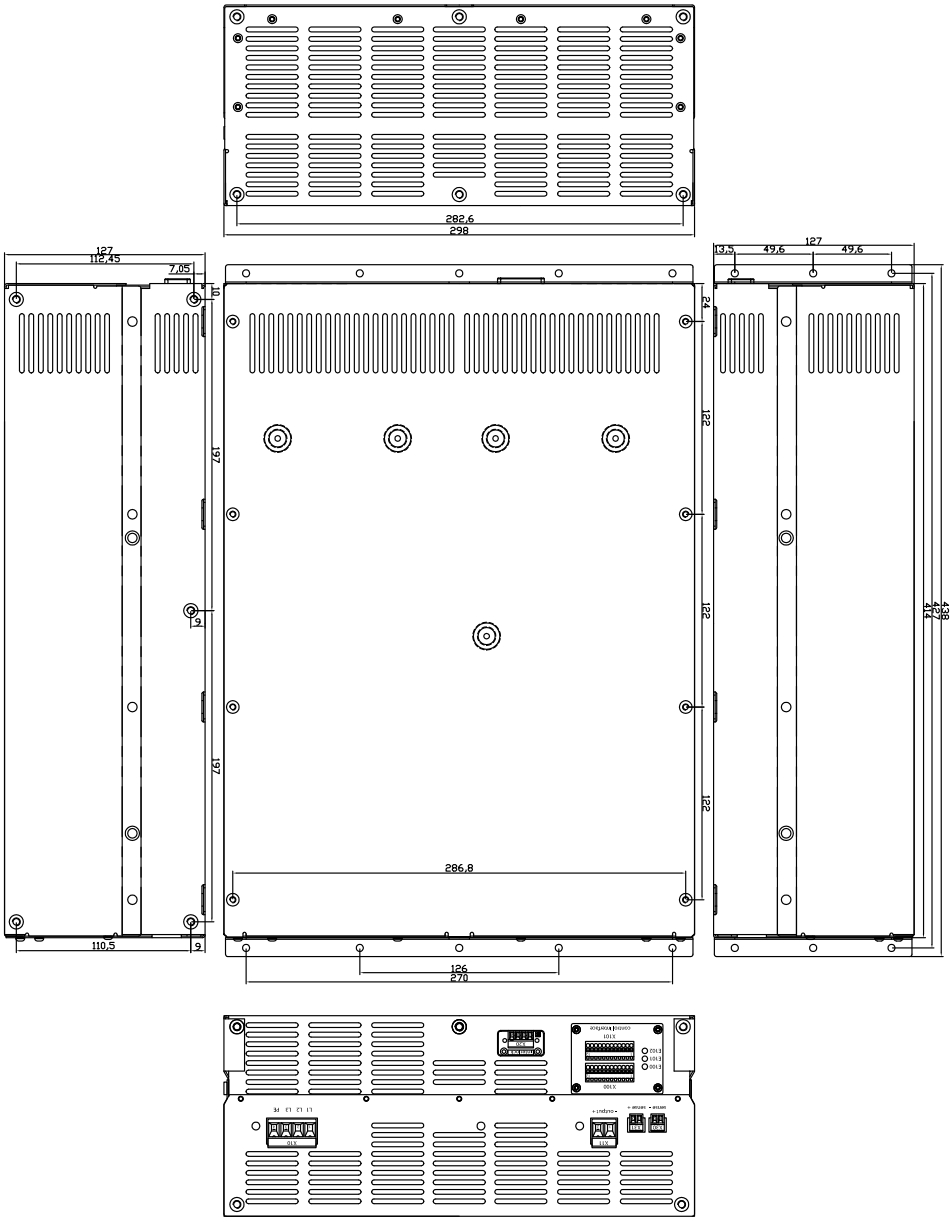
The power supplies always need an interface. Please specify the power supply as well as the interface with your order.

2400W models 230Vac		5000W models 3x400Vac	
number	**description**	**number**	**description**
45.22.60.40	0-50V 50A	**45.24.20.40**	0-50V 100A
45.22.60.50	0-100V 25A	**45.24.20.50**	0-100V 50A
45.22.60.60	0-150V 16A	**45.24.20.60**	0-150V 25A
45.22.60.70	0-200V 12A	**45.24.20.70**	0-200V 25A
		45.24.20.75	0-250V 20A
45.22.60.80	0-300V 8A	**45.24.20.80**	0-300V 16.5A
45.22.60.90	0-400V 6A	**45.24.20.90**	0-400V 12.5A

Interface Modules		
number	**description**	**connector**
94.60.330.10	analog voltage 0-10Vdc 2x in 2x out	Phoenix MCDV0,5-G1-2,5
94.60.330.20	analog current loop 4-20mA 2x in 2x out each channel isolated, precision +/- 2%	Phoenix MCDV0,5-G1-2,5
94.60.331.10	serial EIA-/RS-232	SUB-D 9-pin female
94.60.333.10	CAN	SUB-D 9-pin male



2400W case dimensions



5000W case dimensions