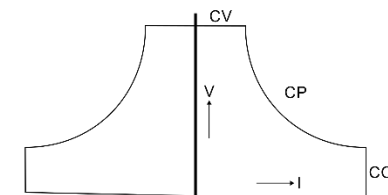




SM6K - Series 6kW DC POWER SUPPLIES

Bi-Directional - Constant Power

Models	Voltage range	Current range
SM40-CP-450	0 – 40 V	-450 – 450 A
SM75-CP-250	0 – 75 V	-250 – 250 A
SM330-CP-55	0 – 330 V	-55 – 55 A
SM1000-CP-18	0 – 1000 V	-18 – 18 A



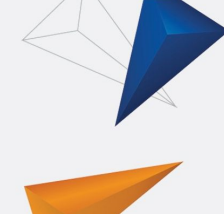
Features

- 6 kW bidirectional DC source & sink
- Constant-power output curve for extended operating range
- Regenerative design: sink power returned to the grid
- High efficiency, resulting in low heat dissipation
- Fast digital control with tunable load response
- Rated for continuous full-power operation
- Comprehensive overload and short-circuit protection

Functionalities

- Wide-range three-phase AC input
- Expandable in functions, interfaces and Master-Slave
- Built-in Ethernet interface with browser-based web interface
- Digital encoders for voltage/current setting and navigation
- Large front-panel display with menu-driven operation
- Temperature-controlled fans for low audible noise
- EMC performance beyond CE (low emission, high immunity)

Your contact:



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Professional Power Supplies

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www.schulz-electronic.de

	SM 40-CP-450	SM 75-CP-250	SM 330-CP-55	SM1000-CP-18
Output rating Voltage range Current range	0 - 40 V - 450 - 450 A	0 - 75 V - 250 - 250 A	0 - 330 V - 55 - 55 A	0 - 1000 V - 18 - 18 A
Regenerative mode Minimum sink voltage <i>Note: Unit switches automatically between source ↔ sink.</i> Absolute maximum sink voltage Minimum sink current	330 mV @ - 450 A 100 mV @ - 150 A 45 mV @ - 45 A 42 V 0.4 %	tbd mV @ - 250 A tbd mV @ - 83.3 A tbd mV @ - 25 A tbd V tbd %	tbd mV @ - 55 A tbd mV @ - 18.3 A tbd mV @ - 5.5 A tbd V tbd %	tbd mV @ - 18 A tbd mV @ - 6 A tbd mV @ - 1.8 A tbd V tbd %
AC Input Rated voltage range Rated frequency Rated current Current, 6kW Power factor, 6kW / 3kW Internal fuses Standby input power ($V_o=I_o=0$) ¹ Standby input power ($V_o=V_{max}$) ¹	380 - 480 V 50 / 60 Hz Maximum 12.2 A 9.8 A 0.99 / 0.95 15 AT 99 W 131 W			
Efficiency (Sink & Source mode): 6 kW, $I_{out}=100\%$ 6 kW, $U_{out}=100\%$	92 % 95 %			
Regulation Load 0 - 100% CV Line 342 - 528 V _{AC} ² CV Load 0 - 100% CC Line 342 - 528 V _{AC} ^{1,3} CC	5 mV < 1 mV 20 mA tbd mA	< tbd mV < tbd mV tbd mA tbd mA	tbd mV < tbd mV tbd mA tbd mA	tbd mV < tbd mV tbd mA tbd mA
Ripple + noise ⁵ Source mode: rms (BW=300 kHz) CV p-p (BW=20 MHz) CV rms (BW=300 kHz) CC p-p (BW=20 MHz) CC 40 V / 150 A rms (BW=300 kHz) CV p-p (BW=20 MHz) CV rms (BW=300 kHz) CC p-p (BW=20 MHz) CC Sink mode: rms (BW=300 kHz) CV p-p (BW=20 MHz) CV rms (BW=300 kHz) CC p-p (BW=20 MHz) CC 40 V / 150 A rms (BW=300 kHz) CV p-p (BW=20 MHz) CV rms (BW=300 kHz) CC p-p (BW=20 MHz) CC	13.3 V / 450 A 0.8 mV 6 mV 16 mA 240 mA 1.8 mV 7 mV 9 mA 110 mA 13.3 V / 450 A 0.7 mV 4 mV 4 mA 30 mA 1.0 mV 5.5 mV 4 mA 30 mA	24 V / 250 A tbd mV tbd mV - - 75 V / 80 A tbd mV tbd mV - - 24 V / 250 A tbd mV tbd mV 75 V / 80 A tbd mV tbd mV - -	109 V / 55 A tbd mV tbd mV - - 330 V / 18.3 A tbd mV tbd mV - - 109 V / 55 A tbd mV tbd mV 330 V / 18.3 A tbd mV tbd mV -	333 V / 18 A tbd mV tbd mV - - 1000 V / 6 A tbd mV tbd mV - - 333 V / 18 A tbd mV tbd mV 1000 V / 6 A tbd mV tbd mV -
Programming & monitoring accuracy ⁴ Voltage Current	± 0.08 % ± 0.15 %			
Temperature coefficient, per °C ^{1,5} CV CC	6 ppm 4 ppm			
Stability over 8 hours ^{1,5} 25 ± 1 °C CV CC ³	23 ppm 28 ppm			

¹ After 1 hour warm up² Remote voltage sense³ Local voltage sense⁴ Excluding INT MOD ANA⁵ Measured at full load

	SM40-CP-450	SM75-CP-250	SM330-CP-55	SM1000-CP-18
Programming speed ^{6, 7} Rise time (10 - 90%) Output voltage step Load = 6 kW Load = 600 W Output voltage step Load = 6 kW Load = 600 W Fall time (90 - 10%) Output voltage step Load = 6 kW Load = 600 W Output voltage step Load = 6 kW Load = 600 W	0 → 13.3 V 0.50 ms 0.45 ms 0 → 40 V 2.3 ms 1.6 ms 13.3 → 0 V 0.45 ms 0.48 ms 40 → 0 V 1.6 ms 1.9 ms	0 → 24 V tbd ms tbd ms 0 → 75 V tbd ms tbd ms 24 → 0 V tbd ms tbd ms 75 → 0 V tbd ms tbd ms	0 → 109 V tbd ms tbd ms 0 → 330 V tbd ms tbd ms 109 → 0 V tbd ms tbd ms 330 → 0 V tbd ms tbd ms	0 → 333 V tbd ms tbd ms 0 → 1000 V tbd ms tbd ms 333 → 0 V tbd ms tbd ms 1000 → 0 V tbd ms tbd ms
Recovery time ^{8, 9} Condition Recovery within di/dt of load step Time Maximum deviation Condition Recovery within di/dt of load step Time Maximum deviation	13.3 V, 225 → 450 A 100 mV 7.5 A/μs 160 μs 0.6 V 40 V, 75 → 150 A 100 mV 2.5 A/μs 240 μs 0.3 V	24 V, 125 → 250 A tbd mV tbd A/μs tbd μs tbd V 75 V, 40 → 80 A tbd mV tbd A/μs tbd μs tbd V	109 V, 28 → 55 A tbd mV tbd A/μs 100 μs tbd V 330 V, 9 → 18 A tbd mV tbd A/μs 150 μs tbd V	333 V, 9 → 18 A tbd V tbd A/μs 100 μs tbd V 1000 V, 3 → 6 A tbd V tbd A/μs 150 μs tbd V
DC output capacitance X-capacitors (typical) Y-capacitors (typical)	20000 μF 825 nF	tbd μF tbd nF	tbd μF tbd nF	tbd μF tbd nF
Output impedance ¹⁰ 0-1 kHz 1-100 kHz CV CV	< 2 mΩ < 30 mΩ	< tbd mΩ < tbd mΩ	< tbd mΩ < tbd mΩ	< tbd mΩ < tbd mΩ
Pulsating load Max. tolerable AC component of load current f > 1 kHz f < 1 kHz	85 A _{RMS} 450 A _{pk}	tbd A _{RMS} tbd A _{pk}	tbd A _{RMS} 55 A _{pk}	tbd A _{RMS} 18 A _{pk}
Hold-up time V _{out} = 100%, P _{out} = 6 kW I _{out} = 100%, P _{out} = 6 kW V _{out} = 100%, P _{out} = 3 kW	9.9 ms 9.7 ms tbd ms	tbd ms tbd ms tbd ms	tbd ms tbd ms tbd ms	tbd ms tbd ms tbd ms
Turn on delay ¹¹	8 s after mains switch is turned on, output power is available			
Inrush current ¹⁰	tbd A			
Safety standards	EN 61010-1			
Insulation AC / DC terminals Creepage / clearance AC power terminals / case DC power terminals / case	3750 V _{RMS} (1 min.) 8 mm 2500 V _{RMS} 1000 V _{DC} ¹²			
EMC Emission Immunity	EN 61326-1 , class B equipment(for use in domestic establishments) EN 61326-1 , equipment for use in industrial and domestic establishments			
Environmental conditions Storage temperature Operating temperature Output automatically disabled at overtemperature Humidity IP Rating Pollution degree	- 40 to + 70 °C - 20 to + 50 °C, Derate output to 75% at 60 °C Maximum 95% RH, non-condensing, up to 40 °C Maximum 75% RH, non-condensing, up to 50 °C IP20 2			
MTBF	500 000 hrs			

⁶ Measured on resistive load with power supply in CV mode, different conditions may influence the specified speed

⁷ Signal latency depends on the interface used & data traffic

⁸ Local voltage sense

⁹ Remote sensing and long wiring may influence the values

	SM 40-CP-450	SM 75-CP-250	SM 330-CP-55	SM1000-CP-18
Series operation	Series operation not allowed			Series operation not allowed
Maximum total voltage				
Master / slave operation				
Parallel operation	tbd			
Master / slave operation				
Remote sensing	Default 1 V, can be set to 10 V			
Maximum voltage drop per load lead				
Limits	0 - 101 % 0 - 101 % 0 - 101 % 102.5 % - unit will continue to operate (OL-indication in display) 105 % - output is automatically disabled (PROT-indication in display)			
Adjustable				
Voltage				
Current				
Power				
Fixed				
Voltage Over Load level				
Voltage Self-Protection level				
Potentiometers	15 bits			
Front panel control knob resolution				
Meter scale	4 digits	4 digits	4 digits	4 digits
Voltage	0.00 - 40.00 V	0.0 - 75.0 V	0.0 - 330.0 V	0 – 1000 V
Current	-450.0 - 450.0 A	-250.0 - 250.0 A	-55.0 - 55.0 A	-18.00 - 18.00 A
Power	-6000 – 6000 W	-6000 – 6000 W	-6000 – 6000 W	-6000 – 6000 W
Accuracy read output	0.2% + 2 digit	0.2% + 2 digit	0.2% + 2 digit	0.2% + 2 digit
Mounting	Stacking of units allowed			
AC terminals (CON A)	Screw terminals for wire 4 mm², 3 phase + earth (no neutral)			
DC terminals (CON B1 & B2)	M12 bolts		M8 bolts	
Programming connectors (LAN)	Standard with RJ45-connector for Ethernet at rear panel, 1000 Mb/s, full-duplex			
Interlock (CON F)	Input for contact at rear panel			
Cooling	Low noise, fan speed adapts to temperature of internal system ca. tbd dBA at full load, 25 °C ambient temperature, 1 m distance ca. tbd dBA at full load, 50 °C ambient temperature, 1 m distance From left to right Output shuts down in case of insufficient cooling (over temperature indication in display)			
Audio noise level				
Airflow direction				
Thermal protection				
Dimensions	88.1 x 483 mm (19", 2 U) 86 x 448 x 586 mm (excluding feet) <i>No additional depth is required with optional interfaces assembled</i>			
Front panel: h x w				
behind front panel: h x w x d				
Weight	16 kg			

CV = Constant Voltage

CC = Constant Current

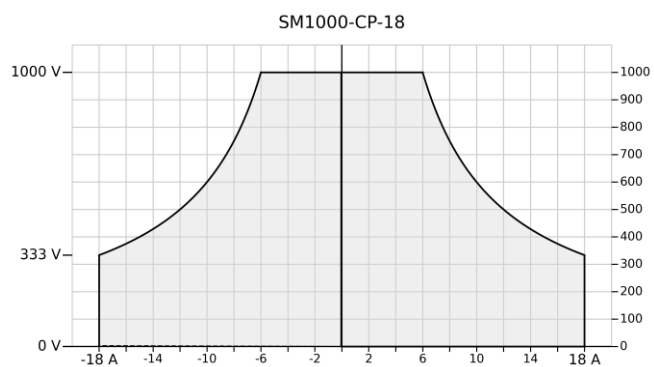
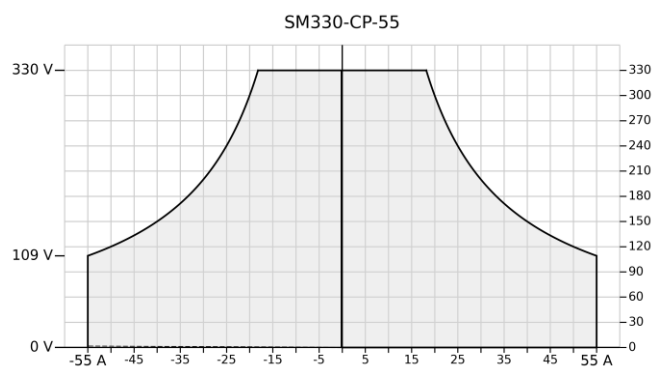
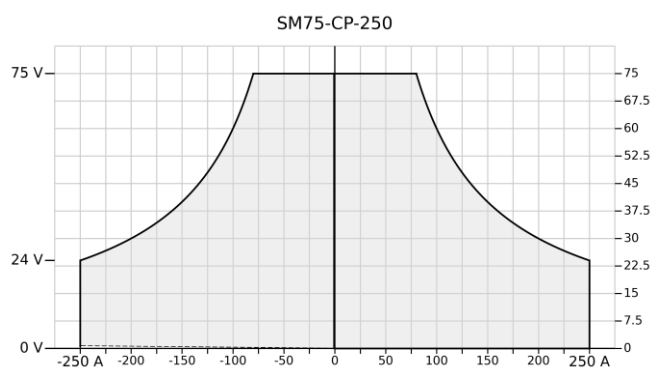
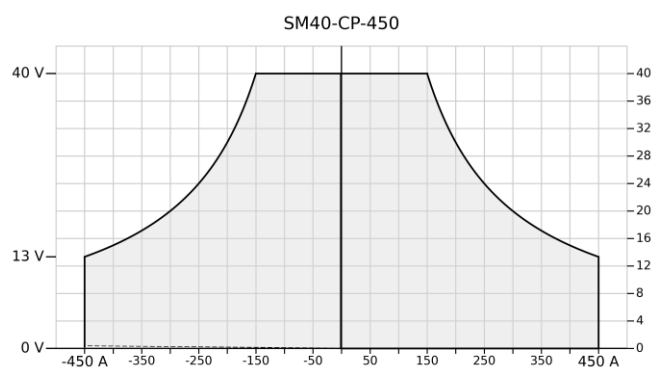
CP = Constant Power

Specifications measured at $T_{amb} = 25 \pm 5 \text{ }^{\circ}\text{C}$ and $V_{in} = 400 \text{ V}_{AC}$, 3 phase, 50 Hz unless otherwise noted.

The information in this document is subject to change without notice.

¹⁰ Typical¹¹ Unit should be configured to switch on the output at startup¹² See "Safety Instructions"

Operating range



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¹³ Operating range graphs are visualisations of the output specifications.

[illegible]

The image shows the rear panel of a Delta Electronics VFD040A010-2. The panel is silver with various ports and terminals. On the left, there are four vertical slots for plug-and-play modules. Below these are ports for LAN, CONFG, CON F, and CONE. In the center, there are two large DC output power terminals labeled CON B1 and CON B2. To the right of these are two remote sense terminals labeled CON C1 and CON C2. Further right is an AC mains connector labeled CON A. On the far right, there are mounting feet. The panel also features safety warnings, a CE mark, and technical specifications: RATED VOLTAGE 200-480V AC/3 50/60Hz and RATED CURRENT 12.2A. The Delta Electronics logo and website are also visible.

4x Plug-and-Play Interface Module Slots

Compatible modules: Isolated Analog, Anybus-carrier (CANopen/ EtherCAT/ Ethernet/IP / Modbus-TCP/ PROFIBUS/ PROFINET), Serial (RS485/RS422/RS232/USB), Digital I/O, Isolated Contacts (Relays, floating-Interlock), and Master/Slave-2

Remote sense

AC mains connector (contra-plug supplied, AC line cord not supplied)

Ethernet, USB device (Type B), USB (Type A), Interlock

DC output power terminals

Mounting feet supplied (not pre-installed)

Safety covers are supplied for in- and output (not shown)

Typical Applications

- PV simulation and inverter testing
- Automotive test systems
- Automotive battery simulation
- Controlled battery (dis)charge test
- ATE in industrial production lines
- Precision current sources
- PWM-controlled DC motor testing
- Renewable-energy systems
- Plasma chambers
- Lasers
- Aerospace applications
- Defense / military applications

Standard Features



Bi-Directional Two-Quadrant Output

Full-power bidirectional two-quadrant operation keeps the DC output voltage constant whether power is sourced or sunk. Ideal for PWM-controlled DC motors and ATE systems.



Digital CV- and CC-Settings

Long-life digital encoders on the front panel provide precise CV/CC setting with coarse/fine adjustment and full front-panel lock (including CV/CC knobs).



High Voltage Isolation

A high DC output isolation allows floating operation up to 1000 V for all types.



Sequencer

Arbitrary Waveform generator or standalone automation.



Ethernet Interface

Ethernet interface for programming and monitoring (SCPI), including an integrated web interface for remote control.



USB-Input

Feature not yet available. Front and rear USB inputs (Host / Type-A) are planned for exchanging settings and waveforms. Sequences can be uploaded via the web interface.

Interfaces



Plug-and-play extension modules

Interfacing and functional capabilities of the power supply can be extended at any time by inserting modules. Four slots are available at the rear of the power supply unit. Consult the [interfaces data sheet](#) for more information.

Modules:

- **Isolated Analog programming** (INT-MOD-ANA)
High speed and accurate analog programming and monitoring
- **Anybus-carrier** (INT-MOD-ANY)
Carrier for Anybus CompactCom 40 fieldbus inserts:
CANopen, EtherCAT, Ethernet/IP, Modbus-TCP, POWERLINK, PROFIBUS, PROFINET
- **Digital I/O** (INT-MOD-DIG)
Interacts with sequencer and Ethernet programming.
- **Isolated contacts** (INT-MOD-CON)
Programmable relays and floating interlock
- **Serial communication** (INT-MOD-SER)
RS232, RS485, RS422, USB
- **Master/Slave** (INT MOD M/S-2)
Series/parallel output configuration

Where to buy?

Visit our [website to request a quote](#), free of charge.

Alternatively, contact us directly or get in touch with one of our [authorized distributors](#).

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