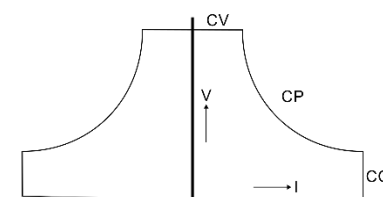




SM6K - Series 6kW DC POWER SUPPLIES

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)

	SM40-CP-450	SM75-CP-250	SM330-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 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 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 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 40 V / 150 A 1.8 mV 7 mV 9 mA 110 mA 13.3 V / 450 A 0.7 mV 4 mV 4 mA 30 mA 40 V / 150 A 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 mV 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 100 μs tbd V 75 V, 40 → 80 A tbd mV tbd A/μs 100 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	tbd A _{RMS} tbd A _{pk}	tbd A _{RMS} tbd A _{pk}	tbd A _{RMS} tbd A _{pk}	tbd A _{RMS} tbd 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				
Maximum total voltage	Series operation not allowed			Series operation not allowed
Master / slave operation				
Parallel operation				
Master / slave operation	tbd			
Remote sensing				
Maximum voltage drop per load lead	Default 1 V, can be set to 10 V			
Limits				
Adjustable				
Voltage	0 - 101 %			
Current	0 - 101 %			
Power	0 - 101 %			
Fixed				
Voltage OverLoad level	102.5 % - unit will continue to operate (OL-indication in display)			
Voltage Self-Protection level	105 % - output is automatically disabled (PROT-indication in display)			
Potentiometers				
Front panel control knob resolution	15 bits			
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				
Audio noise level	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			
Airflow direction	From left to right			
Thermal protection	Output shuts down in case of insufficient cooling (over temperature indication in display)			
Dimensions				
Front panel: h x w	88.1 x 483 mm (19", 2 U)			
behind front panel: h x w x d	86 x 448 x 586 mm (excluding feet)			
	No additional depth is required with optional interfaces assembled			
Weight	16 kg			

CV = Constant Voltage

CC = Constant Current

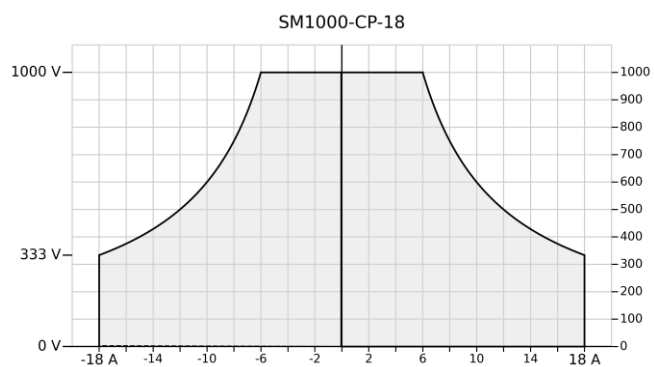
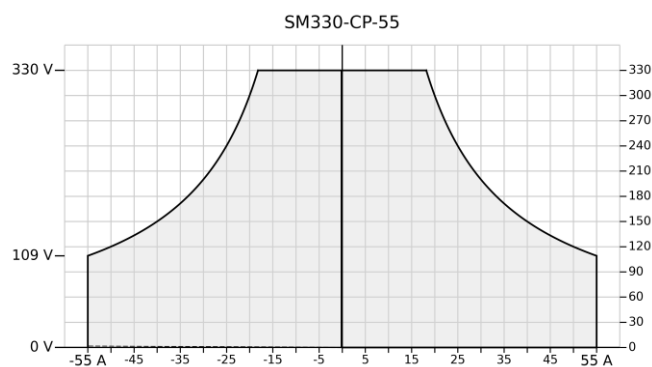
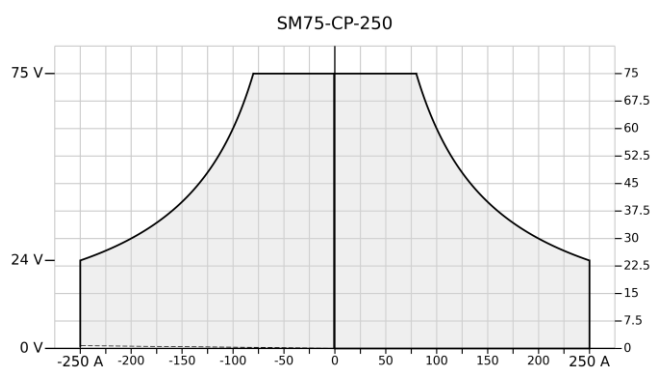
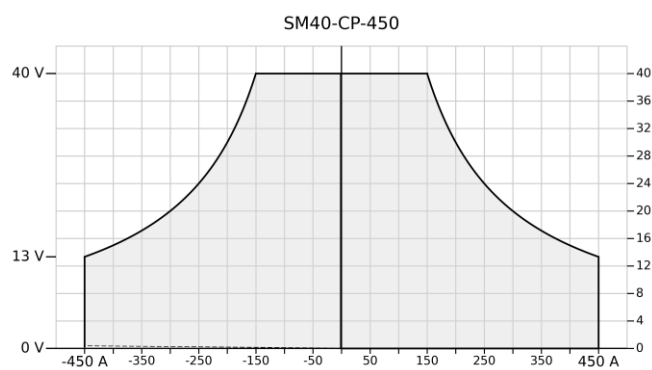
CP = Constant Power

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"

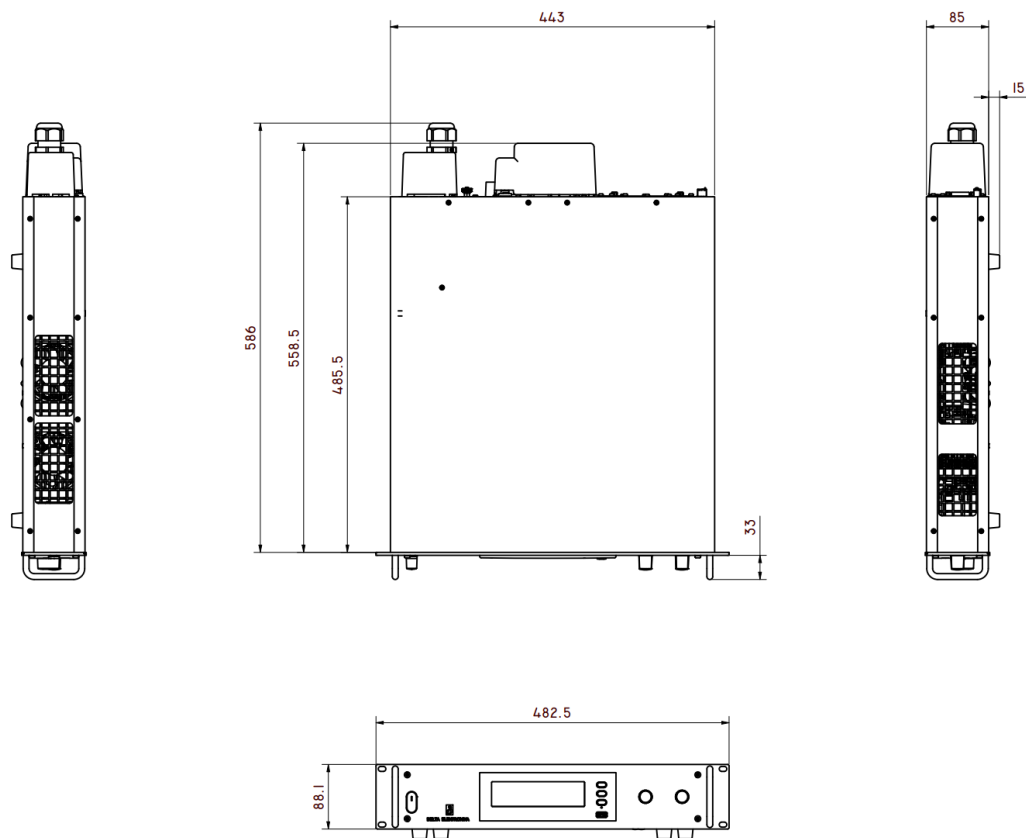
Operating range



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¹³ Operating range graphs are visualisations of the output specifications.

Dimensions



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