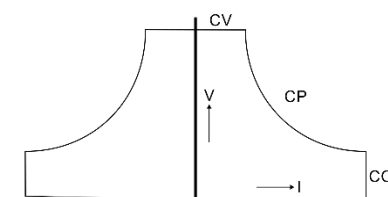




SM6K - Series 6kW DC POWER SUPPLIES

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)

	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	400 mV @ - 450 A 125 mV @ - 150 A 80 mV @ - 45 A 42 V 0.4 %	400 mV @ - 250 A 130 mV @ - 83.3 A 100 mV @ - 25 A 78 V 0.4 %	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, 6 kW Power factor, 6 kW / 3 kW 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 0.995 / 0.988 15 AT 160 W 185 W			
Efficiency (Sink & Source mode): 6 kW, $I_{out}=100\%$ 6 kW, $U_{out}=100\%$	92 % 95 %	93 % 95 %	tbd tbd	tbd tbd
Regulation Load 0 - 100 % ² CV Line 342 - 528 V _{AC} ² CV Load 0 - 100 % ^{1,3} CC Line 342 - 528 V _{AC} ^{1,3} CC	1 mV 1 mV 40 mA 1 mA	2 mV 1 mV 30 mA 4 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 rms (BW = 300 kHz) CV p-p (BW = 20 MHz) CV rms (BW = 300 kHz) CC Sink mode: rms (BW = 300 kHz) CV p-p (BW = 20 MHz) CV rms (BW = 300 kHz) CC rms (BW = 300 kHz) CV p-p (BW = 20 MHz) CV rms (BW = 300 kHz) CC	13.3 V / 450 A 2.5 mV 15 mV 35 mA 40 V / 150 A 4 mV 25 mV 15 mA 13.3 V / 450 A 1.6 mV 15 mV 40 mA 40 V / 150 A 2.5 mV 20 mV 25 mA	24 V / 250 A 1.5 mV 12 mV 20 mA 75 V / 80 A 1.5 mV 12 mV 8 mA 24 V / 250 A 1 mV 10 mV 30 mA 75 V / 80 A 1.5 mV 12 mV 15 mA	109 V / 55 A tbd mV tbd mV tbd mA 330 V / 18.3 A tbd mV tbd mV tbd mA 109 V / 55 A tbd mV tbd mV tbd mA 330 V / 18.3 A tbd mV tbd mV tbd mA	333 V / 18 A tbd mV tbd mV tbd mA 1000 V / 6 A tbd mV tbd mV tbd mA 333 V / 18 A tbd mV tbd mV tbd mA 1000 V / 6 A tbd mV tbd mV tbd mA
Programming & monitoring accuracy ⁴ Voltage Current	± 0.08 % ± 0.15 %			
Temperature coefficient, per °C ^{1,5} CV CC	15 ppm 40 ppm	20 ppm 40 ppm	tbd tbd	tbd tbd
Stability over 8 hours ^{1,5} CV 25 ± 1 °C CC ³	45 ppm 40 ppm	35 ppm 85 ppm	tbd tbd	tbd tbd

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

	SM 40-CP-450	SM 75-CP-250	SM 330-CP-55	SM 1000-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 0.6 ms 0.6 ms 0 → 40 V 2.8 ms 1.9 ms 13.3 → 0 V 0.5 ms 0.5 ms 40 → 0 V 1.4 ms 1.8 ms	0 → 24 V 1.5 ms 1.1 ms 0 → 75 V 4.6 ms 3.2 ms 24 → 0 V 1.1 ms 1.1 ms 75 → 0 V 2.4 ms 3.0 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 5 A/μs 130 μs 0.6 V 40 V, 75 → 150 A 100 mV 2 A/μs 75 μs 0.25 V	24 V, 125 → 250 A 100 mV 3 A/μs 100 μs 0.4 V 75 V, 40 → 80 A 100 mV 0.9 A/μs 100 μs 0.15 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 ¹⁰ X-capacitors Y-capacitors X-cap bleeder resistor Y-cap bleeder resistor	21 mF 860 nF 1.6 kΩ 10 MΩ	9 mF 860 nF 3.2 kΩ 10 MΩ	tbd μF tbd nF tbd kΩ tbd MΩ	tbd μF tbd nF tbd kΩ tbd MΩ
Output impedance ¹⁰ 0-1 kHz 1-100 kHz	CV CV < 1.5 mΩ < 30 mΩ	< 2 mΩ < 40 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}	60 A _{RMS} 250 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	7.5 ms 7.5 ms 9.5 ms	7.5 ms 7.5 ms 9.5 ms	tbd ms tbd ms tbd ms	tbd ms tbd ms tbd ms
Turn on delay ¹¹	10 s after mains switch is turned on, output power is available			
Inrush current ¹⁰	30 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.

¹⁰ Typical

	SM40-CP-450	SM75-CP-250	SM330-CP-55	SM1000-CP-18
Series operation Master / slave operation	Series operation not allowed			
Parallel operation Master / slave operation	tbd		tbd	
Remote sensing Maximum voltage drop per load lead	Default 1 V, can be set to 10 V			
Limits Adjustable Voltage Current Power Fixed Voltage Overload level Voltage Self-Protection level	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)			
Potentiometers Front panel control knob resolution	15 bits			
Meter scale Voltage Current Power Accuracy read output	4 digits 0.00 - 40.00 V -450.0 - 450.0 A -6000 – 6000 W 0.2 % + 2 digit	4 digits 0.0 - 75.0 V -250.0 - 250.0 A -6000 – 6000 W 0.2 % + 2 digit	4 digits 0.0 - 330.0 V -55.0 - 55.0 A -6000 – 6000 W 0.2 % + 2 digit	4 digits 0 – 1000 V -18.00 - 18.00 A -6000 – 6000 W 0.2 % + 2 digit
Mounting	Stacking of units allowed			
AC terminals (CON A)	Screw terminals for wire 4 mm ² , 3 phase + earth (no neutral)			
DC terminals (CON B1 & B2)	M12 bolts		M8 bolts	
Programming connectors (LAN)	Standard with RJ45-connector for Ethernet, 1000 Mb/s, full-duplex			
Interlock (CON F)	Input for external floating contact			
Cooling Audio noise level Airflow direction Thermal protection	Low noise, fan speed adapts to temperature of internal system ca. 52 dBA at full load, 25 °C ambient temperature, 1 m distance ca. 66 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)			
Dimensions Front panel: h x w behind front panel: h x w x d	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>			
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.

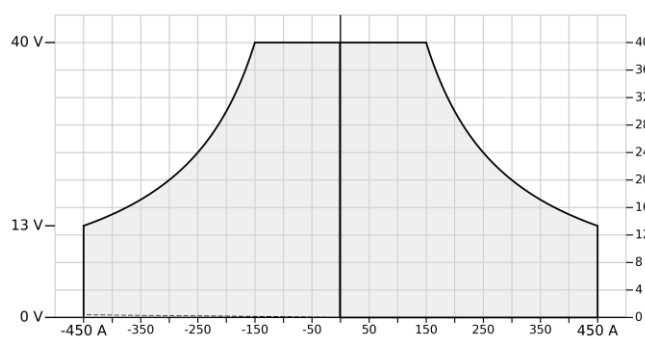
The information in this document is subject to change without notice.

TBD = To Be Determined

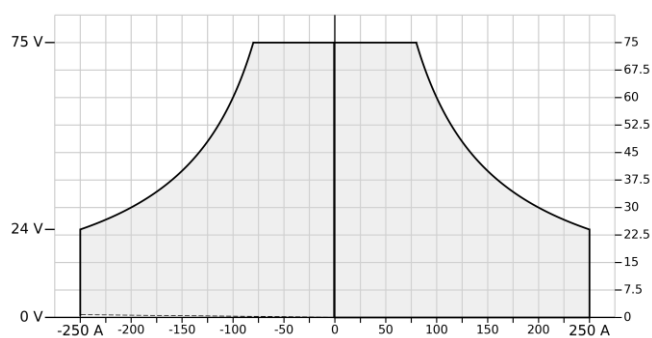
¹¹ Unit should be configured to switch on the output at startup¹² See "Safety Instructions" in the product manual.

Operating range

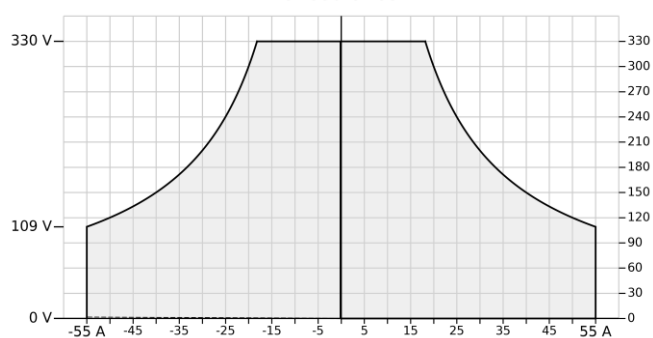
SM40-CP-450



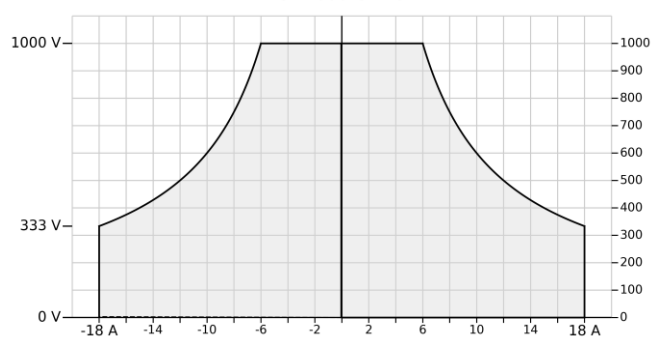
SM75-CP-250



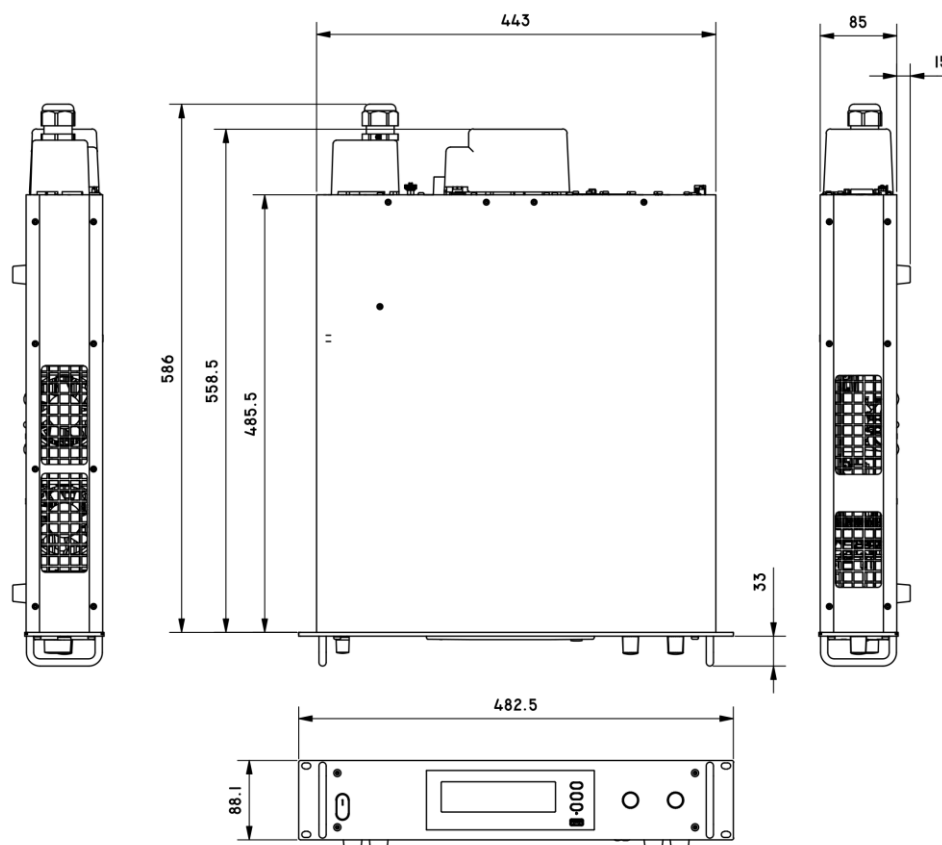
SM330-CP-55



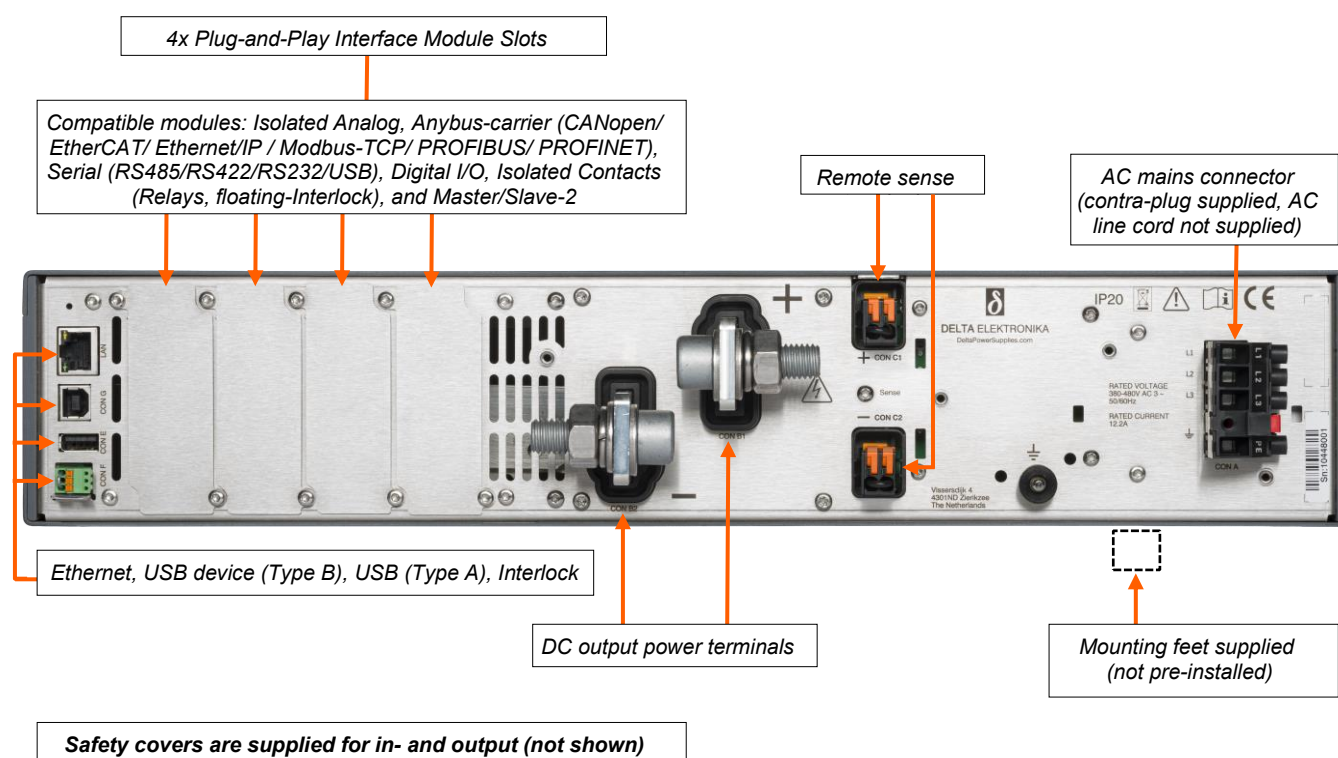
SM1000-CP-18



Dimensions



Rear view



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.

Sequencer functionality is planned for a future firmware release.



Ethernet Interface

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



USB-Input

Front and rear USB inputs are intended for exchanging settings and waveform files. Sequences can be uploaded via the web interface.

USB input functionality is planned for a future firmware release.

Interfaces: - Interface Modules same as for SM15K consult sales office for details - Tel +44 (0)1635-521858



Plug-and-play extension modules

The interfacing and functional capabilities of the power supply can be extended at any time by inserting plug-and-play modules. Four slots are available at the rear of the power supply unit. See the [Interfaces data sheet](#) for details.

Interface module functionality is planned for a future firmware release.

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, 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 functionality.