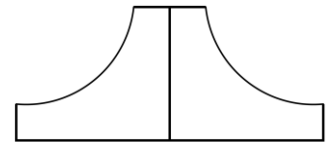




## SM15K - Series 15kW DC POWER SUPPLIES

### Bi-Directional - Constant Power

Models	Voltage range	Current range
SM70-CP-450	0 – 70 V	- 450 – 450 A
SM210-CP-150	0 – 210 V	-150 – 150 A
SM500-CP-90	0 – 500 V	-90 – 90 A
SM1000-CP-45	0 – 1000V	-45 – 45 A
SM1500-CP-30	0 – 1500 V	-30 – 30 A



### Features

- Bi-directional power supply, standard 15kW Source & Sink
- Flexible output with constant power characteristic
- Power regeneration technology: sink power is not dissipated but fed back into the grid
- Designed for long life at continuous full power
- Excellent dynamic response to load changes, digital controlled with the possibility to adapt to the type of load
- Very low heat dissipation, efficiency 95% or more
- Protected against all overload and short circuit conditions

### Functionalities

- Operation on a wide range of three phase AC input voltages
- Standard ethernet & web interface
- EMC surpasses CE requirements: low emission & high immunity
- Low audible noise: temperature controlled cooling fans
- Durable digital encoders for voltage & current adjustment and menu operation
- Large user display, menu driven operations



	<b>SM70-CP-450</b>	<b>SM210-CP-150</b>	<b>SM500-CP-90</b>	<b>SM1000-CP-45</b>	<b>SM1500-CP-30</b>
<b>Programming speed</b> <sup>6, 7</sup> <b>Rise time (10 - 90%)</b>					
Output voltage step	0 → 33 V	0 → 100 V	0 → 167 V	0 → 333 V	0 → 500 V
Load = 15 kW	2.2 ms	1.6 ms	1.5 ms	1.5 ms	1.5 ms
Load = 1500 W	1.5 ms	1.3 ms	1 ms	1 ms	1 ms
Output voltage step	0 → 70 V	0 → 210 V	0 → 500 V	0 → 1000 V	0 → 1500 V
Load = 15 kW	5.5 ms	3 ms	4.5 ms	4.5 ms	4.5 ms
Load = 1500 W	3.5 ms	2.7 ms	3.5 ms	3.5 ms	3.5 ms
<b>Fall time (90 - 10%)</b>					
Output voltage step	33 → 0 V	100 → 0 V	167 → 0 V	333 → 0 V	500 → 0 V
Load = 15 kW	1.5 ms	1.3 ms	0.8 ms	0.9 ms	0.8 ms
Load = 1500 W	1.5 ms	1.3 ms	0.9 ms	1.0 ms	0.9 ms
Output voltage step	70 → 0 V	210 → 0 V	500 → 0 V	1000 → 0 V	1500 → 0 V
Load = 15 kW	2.6 ms	2.5 ms	2.5 ms	2.8 ms	2.8 ms
Load = 1500 W	3.5 ms	2.5 ms	3.5 ms	3.5 ms	3.5 ms
<b>Recovery time</b> <sup>8, 9</sup>					
Condition	33V, 225 → 450A	100V, 75 → 150A	167V, 45 → 90A	333V, 22.5 → 45A	500V, 15 → 30A
Recovery within	100 mV	500 mV	750 mV	2.5 V	2.8 V
di/dt of load step	5 A/μs	2.4 A/μs	0.8 A/μs	0.4 A/μs	0.25 A/μs
Time	100 μs	100 μs	100 μs	100 μs	100 μs
Maximum deviation	0.8 V	1.4 V	2.8 V	9.0 V	9.0 V
Condition	70V, 112 → 215A	210V, 36 → 72A	500V, 15 → 30A	1000V, 7.5 → 15A	1500V, 5 → 10A
Recovery within	100 mV	250 mV	500 mV	1 V	1.2 V
di/dt of load step	2 A/μs	1.15 A/μs	0.25 A/μs	0.15 A/μs	0.085 A/μs
Time	100 μs	100 μs	150 μs	150 μs	150 μs
Maximum deviation	0.3 V	0.75 V	1.2 V	3.0 V	3.5 V
<b>DC output capacitance</b>					
X-capacitors (typical)	22000 μF	1170 μF	560 μF	141 μF	58 μF
Y-capacitors (typical)	950 nF	950 nF	145 nF	145 nF	145 nF
<b>Output impedance</b> <sup>10</sup>					
0-1 kHz <b>CV</b>	< 0.75 mΩ	< 5 mΩ	< 16 mΩ	< 150 mΩ	< 250 mΩ
1-100 kHz <b>CV</b>	< 40 mΩ	< 40 mΩ	< 160 mΩ	< 800 mΩ	< 2 Ω
<b>Pulsating load</b>					
Max. tolerable AC component of load current					
f > 1 kHz	60 A <sub>RMS</sub>	15 A <sub>RMS</sub>	15 A <sub>RMS</sub>	3 A <sub>RMS</sub>	2.5 A <sub>RMS</sub>
f < 1 kHz	450 A <sub>pk</sub>	150 A <sub>pk</sub>	90 A <sub>pk</sub>	45 A <sub>pk</sub>	30 A <sub>pk</sub>
<b>Hold-up time</b>					
V <sub>out</sub> = 100%, P <sub>out</sub> = 15 kW	10 ms	10 ms	15 ms	15 ms	15 ms
I <sub>out</sub> = 100%, P <sub>out</sub> = 15 kW	10 ms	10 ms	15 ms	15 ms	15 ms
V <sub>out</sub> = 100%, P <sub>out</sub> = 7.5 kW	25 ms	20 ms	35 ms	35 ms	35 ms
<b>Turn on delay</b> <sup>11</sup>	2.5 s after mains switch is turned on, the rated output voltage is reached				
<b>Inrush current</b> <sup>10</sup>	23 A				
<b>Safety standards</b>	EN 60950 / EN 61010				
<b>Insulation</b>					
AC / DC terminals	3750V <sub>RMS</sub> (1 min.)				3750 V <sub>RMS</sub> (1 min.)
Creepage / clearance	8 mm				8 mm
AC power terminals / case	2500 V <sub>RMS</sub>				2500 V <sub>RMS</sub>
DC power terminals / case	1000 V <sub>DC</sub> <sup>12</sup>				1500 V <sub>DC</sub> <sup>12</sup>
<b>EMC</b>	<b>EN 61326-1</b> , class B equipment(for use in domestic establishments) <b>EN 61326-1</b> , equipment for use in industrial and domestic establishments				
<b>Environmental conditions</b>	Storage temperature: -40 to +85 °C Operating temperature: -20 to +50 °C, Derate output to 75% at 60 °C <i>Output automatically disabled at overtemperature</i> Humidity: Maximum 95% RH, non condensing, up to 40 °C Maximum 75% RH, non condensing, up to 50 °C IP Rating: IP20 Pollution degree: 2				
<b>MTBF</b>	500 000 hrs				

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

<sup>7</sup> Signal latency depends on the interface used & data traffic

<sup>8</sup> Local voltage sense

<sup>9</sup> Remote sensing and long wiring may influence the values

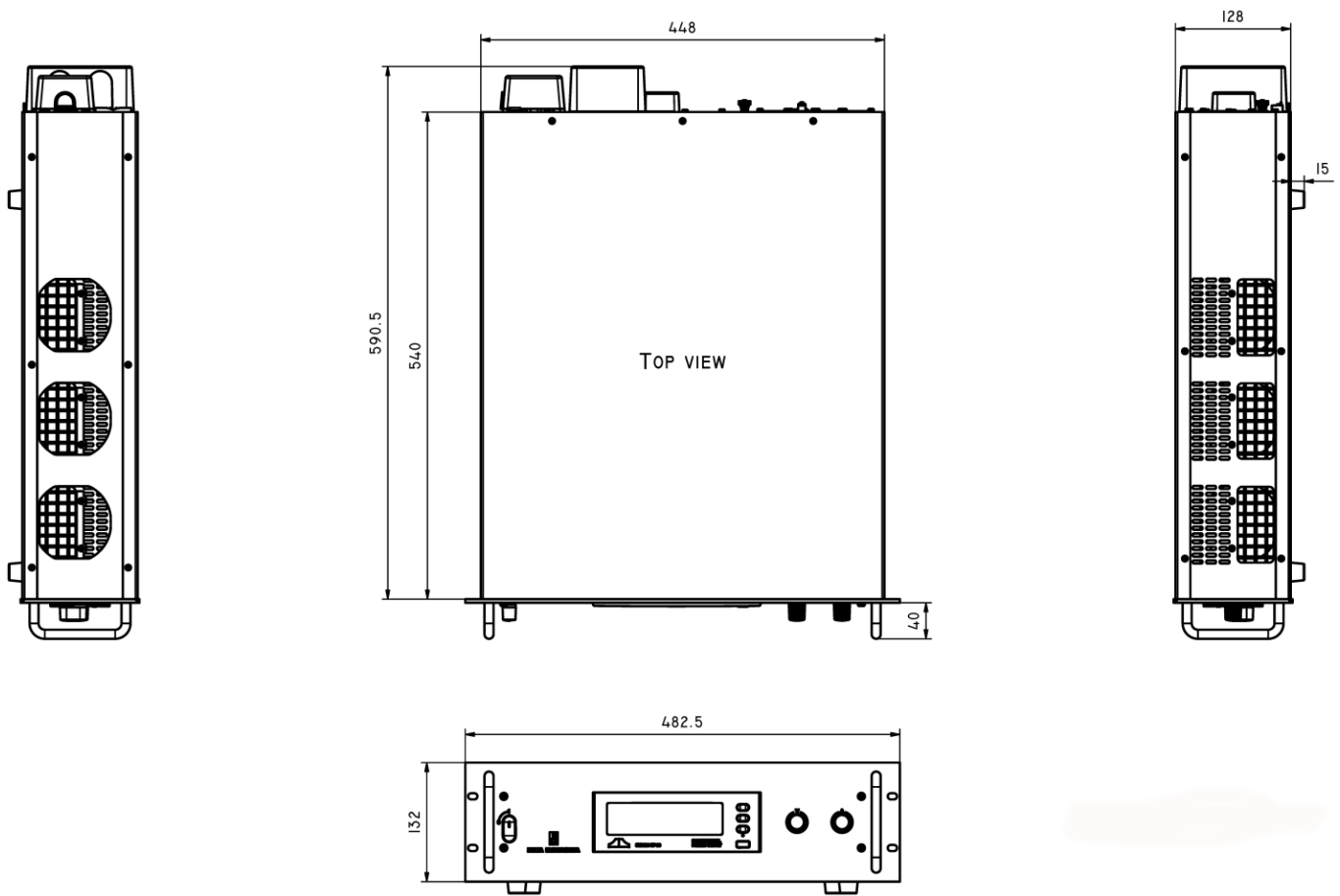
<sup>10</sup> Typical

<sup>11</sup> Unit should be configured to switch on the output at startup

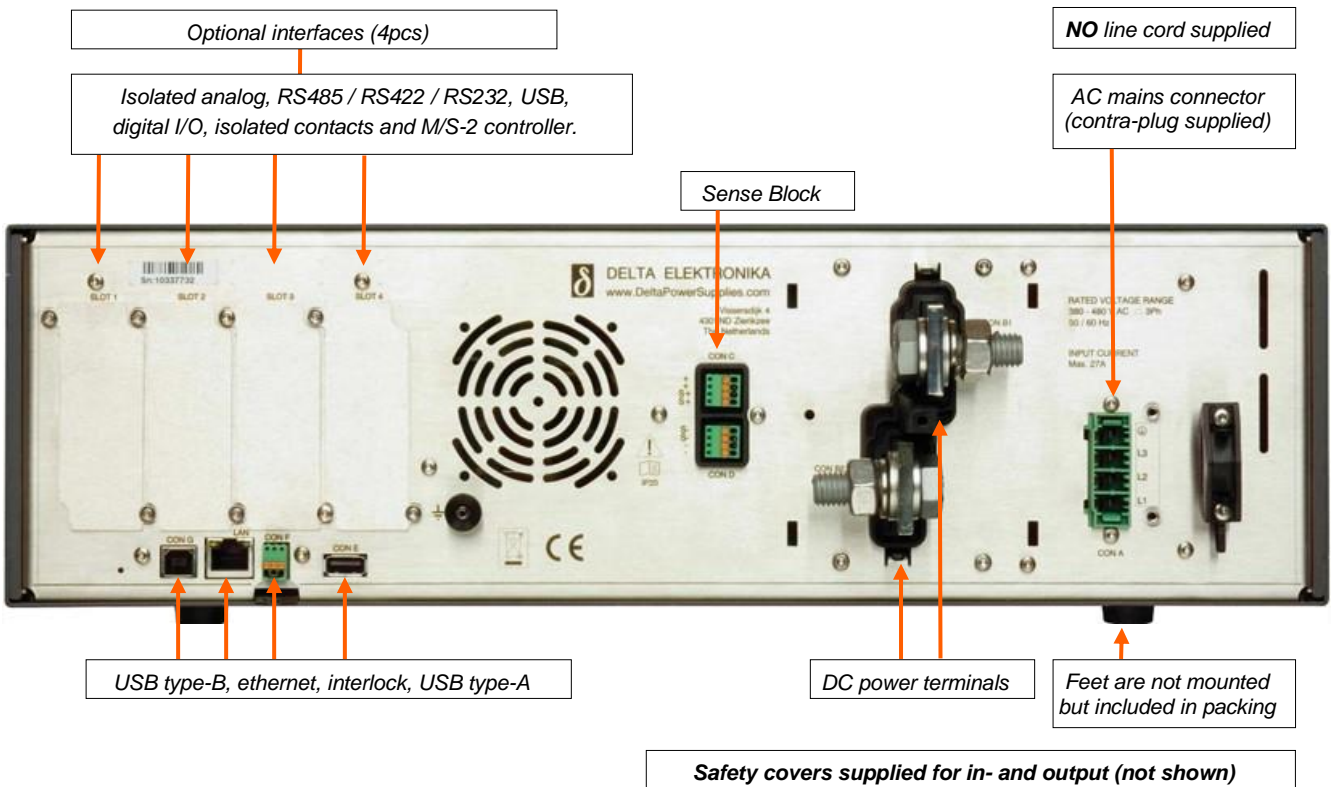
<sup>12</sup> See "Safety Instructions"



**Dimensions**



**Rear view**



### Typical Applications

- Solar inverter testing, PV-Simulation
- Car testing systems
- ATE in industrial production lines
- Plasma chambers
- Automotive battery simulations
- Controlled battery (dis)charging
- Lasers
- Sustainable energy
- Driving PWM-Controlled DC motors
- Accurate current sources
- Aerospace and military equipment

### Standard Features



**Bi-Directional Two-Quadrant Output**

Full power Bi-Directional two quadrant operation maintains the DC output voltage constant whether the output power is positive or negative. Ideal for PWM-speed controlled DC-Motors and ATE systems.



**Digital CV-, CC- and CP-Settings**

Reliable, long-life digital encoders are mounted at the front panel. Includes total front panel lock (also for CV- / CC-knobs) and a coarse or fine pitch adjustment depending on the turning speed.



**High Voltage Isolation**

A high DC output isolation allows floating operation up to 1000 V for SM70-CP-450, SM210-CP-150, SM500-CP-90 and SM1000-CP-45 and up to 1500 V for SM1500-CP-30.



**Sequencer**

Arbitrary Waveform generator or standalone automation.



**Ethernet Interface**

Ethernet interface for programming and monitoring



**USB-Input**

Not yet available: USB-Input for exchange of settings or for controlling the unit.

### Options



**Software control and Interfaces**

Field installable interfaces:

- Master / Slave controller
- Isolated Contacts
- Serial controller with multiple protocols: RS 232, RS 485, RS 422 and USB (Device)
- Digital I/O
- Isolated Analog Programming

Order Codes:

- INT MOD M/S-2
- INT MOD CON
- INT MOD SER
- INT MOD DIG
- INT MOD ANA