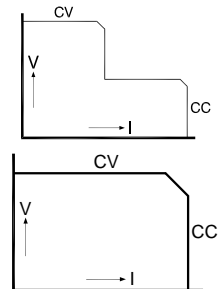




## SM 3300 - Series 3300 W DC POWER SUPPLIES

### One or Three phase input

Models	Voltage range	Current range
SM 18-220	0 - 18 V	0 - 220 A
SM 66-AR-110 Autoranging output	0 - 33 V 0 - 66 V	0 - 110 A 0 - 55 A
SM 100-AR-75 Autoranging output	0 - 50 V 0 - 100 V	0 - 75 A 0 - 37.5 A
SM 330-AR-22 Autoranging output	0 - 165 V 0 - 330 V	0 - 22 A 0 - 11 A
SM 660-AR-11 Autoranging output	0 - 330 V 0 - 660 V	0 - 11 A 0 - 5.5 A



### Features

- Designed for long life at full power
- Excellent dynamic response to load changes
- Protected against all overload and short circuit conditions
- EMC surpasses CE requirements: low emission & high immunity
- Low audible noise: fan is temperature controlled
- Available Options : Software control and Interfaces, High Speed Programming, Two-Quadrant Output - PowerSink

### Functionalities

- Operation on single and three phase input voltages
- Standard Ethernet interface
- Large user display, menu driven operations
- Durable digital encoders for voltage and current adjustment
- Plug and play optional interfaces

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	SM 18-220	SM 66-AR-110	SM 100-AR-75	SM 330-AR-22	SM 660-AR-11
<b>Output</b> voltage current	0 - 18 V 0 - 220 A	0 - 66 V 0 - 110 A	0 - 100 V 0 - 75 A	0 - 330 V 0 - 22 A	0-660V 0-11 A
<b>Input</b> <b>AC</b> 1 or 3 phase, 48 - 62 Hz rated voltage range rated frequency rated current  current (400 V / 3 ph, 3300W) power factor, 3300W, 1750W  <i>Power Derating vs input</i> <i>Single phase:</i> 230 V : P <sub>out max</sub> (W), I <sub>in</sub> (A) 205 V : P <sub>out max</sub> (W), I <sub>in</sub> (A) 180 V : P <sub>out max</sub> (W), I <sub>in</sub> (A)  <i>Three phase</i> 190 V : P <sub>out max</sub> (W), I <sub>in</sub> (A) 180 V : P <sub>out max</sub> (W), I <sub>in</sub> (A)  power factor single phase  internal fuses standby input power (V <sub>o</sub> =I <sub>o</sub> =0) standby input power (V <sub>o</sub> =V <sub>max</sub> )	180-528 V 200 - 480 V 50 / 60 Hz Max. 16 A  5.8 A 0.94, 0.92  3050, 16 2650, 16 2300, 16  3300, 12.5 3100, 12.5  0.99  20 AT 30 W 60 W	180-528 V 200 - 480 V 50 / 60 Hz Max. 16 A  5.6 A 0.94, 0.92  3100, 16 2700, 16 2400, 16  3300, 12.5 3100, 12.5  0.99  20 AT 30 W 50 W	180-528 V 200 - 480 V 50 / 60 Hz Max. 16 A  5.6 A 0.94, 0.92  3100, 16 2700, 16 2400, 16  3300, 12.5 3100, 12.5  0.99  20 AT 30 W 50 W	180-528 V 200 - 480 V 50 / 60 Hz Max. 16 A  5.6 A 0.94, 0.92  3200, 16 2800, 16 2400, 16  3300, 12.5 3100, 12.5  0.99  20 AT 30 W 50 W	180-528 V 200 - 480 V 50 / 60 Hz Max. 16 A  5.6 A 0.94, 0.92  3200, 16 2800, 16 2400, 16  3300, 12.5 3100, 12.5  0.99  20 AT 30 W 60 W
<b>Efficiency</b> 400 V AC, 3 ph input, full load	89 %	90 %	90 %	91 %	92 %
<b>Regulation</b>					
Load 0 - 100% <b>CV</b> Line 180 - 528 V AC <b>CV</b> (external voltage sense)	2.5 mV 0.2 mV	5 mV 1 mV	5 mV 1 mV	5 mV 3 mV	5 mV 4 mV
Load 0 - 100% <b>CC</b> Line 180 - 528 V AC <b>CC</b> (internal voltage sense, after warm-up)	12 mA 3 mA	6 mA 1 mA	2 mA 0.5 mA	1.2 mA 0.2 mA	1.2 mA 0.2 mA
		33 / 66 V	50 / 100 V	165 / 330 V	330 / 660 V
<b>Ripple + noise</b> rms (BW=300 kHz) <b>CV</b> p-p (BW=20 MHz) <b>CV</b>  rms (BW=300 kHz) <b>CC</b> p-p (BW=20 MHz) <b>CC</b> <i>CC-ripple at full load</i>	3 mV 12 mV  50 mA 250 mA	7 mV 18 mV  15 / 7.5 mA 90 / 45 mA	7 mV 22 mV  6 / 2 mA 60 / 20 mA	10 mV 50 mV  4.5 / 1.5 mA 24 / 8 mA	15 mV 120 mV  1.8 / 0.6 mA 7.5 / 2.5 mA
<b>Temp. coeff., per °C<sup>-1</sup></b> <b>CV</b> <b>CC</b>			35.10 <sup>-6</sup> 60.10 <sup>-6</sup>		
<b>Stability<sup>1</sup></b> after 1 hr warm-up during 8 hrs <b>CV</b> <b>CC</b>  t <sub>amb</sub> = 25 ± 1 °C, V <sub>in</sub> = 400 V AC internal voltage sensing for CC-stab.			6.10 <sup>-5</sup> 9.10 <sup>-5</sup>		

<b>Programming speed<sup>2</sup></b> <i>Standard Version</i> (resistive load)	SM 18-220	SM 66-AR-110	SM 100-AR-75	SM 330-AR-22	SM 660-AR-11
<b>Rise time (10 - 90%)</b> output voltage step time, (load = 3300 W) time, (load = 330 W)  output voltage step time, (load = 3300 W) time, (load = 330 W)	0 → 15 / 18 V 4 / 5.5 ms 2.2 / 2.6 ms  - -	0 → 33 V 1.6 ms 1 ms  0 → 66 V 7 ms 3.7 ms	0 → 50V 3.6 ms 2 ms  0 → 100 V 15 ms 8 ms	0 → 165 V 3.8 ms 2 ms  0 → 330 V 15 ms 8 ms	0 → 330 V 4.2 ms 2.5 ms  0 → 660 V 15 ms 7.5 ms
<b>Fall time (90 - 10%)</b> output voltage step time, (load = 3300 W) time, (load = 330 W)  output voltage step time, (load = 3300 W) time, (load = 330 W)	15 / 18 V → 0 V 6 / 8 ms 52 / 75 ms  - -	33 V → 0 V 3 ms 33 ms  66 V → 0 V 11 ms 100 ms	50 V → 0 V 6 ms 65 ms  100 V → 0 V 26 ms 260 ms	165 V → 0 V 6 ms 65 ms  330 V → 0 V 25 ms 250 ms	330 V → 0 V 6 ms 70 ms  660 V → 0 V 28 ms 270 ms

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Programming speed <sup>2</sup> High Speed Version (resistive load)	SM 18-220 Option P300	SM 66-AR-110 Option P302	SM 100-AR-75 Option P303	SM 330-AR-22 Option P304	SM 660-AR-11 Option P305
<b>Rise time (10 - 90%)</b> output voltage step time, (load = 3300 W) time, (load = 330 W)	0 → 15 / 18 V 0.17 / 0.24 ms 0.13 / 0.15 ms	0 → 33 V 0.34 ms 0.33 ms	0 → 50 V 0.46 ms 0.46 ms	0 → 165 V 0.38 ms 0.35 ms	0 → 330 V 0.8 ms 0.7 ms
output voltage step time, (load = 3300 W) time, (load = 330 W)	- - -	0 → 66 V 0.44 ms 0.35 ms	0 → 100 V 0.53 ms 0.47 ms	0 → 330 V 1.6 ms 0.8 ms	0 → 660 V 2.8 ms 2.0 ms
Ripple @ full load typical (rms / pp)	15 mV / 50 mV	25 mV / 70 mV	35 mV / 120 mV	50 mV / 120 mV	60 mV / 250 mV
<b>Output Capacitance</b> (typical)	720 μF	315 μF	95 μF	31 μF	15 μF
<b>Fall time (90 - 10%)</b> output voltage step time, (load = 3300 W) time, (load = 330 W)	15 / 18 → 0 V 0.19 / 0.27 ms 0.52 / 0.75 ms	33 → 0 V 0.34 ms 1.6 ms	50 → 0 V 0.42 ms 1.4 ms	165 → 0 V 0.45 ms 4.3 ms	330 → 0 V 0.82 ms 8 ms
output voltage step time, (load = 3300 W) time, (load = 330 W)	- - -	66 → 0 V 0.58 ms 5.7 ms	100 → 0 V 0.53 ms 5 ms	330 → 0 V 2.1 ms 17 ms	660 → 0 V 3.4 ms 30 ms

	SM 18-220	SM 66-AR-110	SM 100-AR-75	SM 330-AR-22	SM 660-AR-11
<b>Recovery time</b> range					
recovery within	50 mV	33 V / 66 V	50 V / 100 V	165 V / 330 V	330 V / 660 V
di/dt of load step	2.7 A/μs	100 mV	100 mV	500 mV	800 / 500 mV
output voltage	15V	1.7 / 0.7 A/μs	1.1 / 0.5 A/μs	0.35 / 0.17 A/μs	0.16 / 0.08 A/μs
time, @ 50 - 100% load step	100 μs	30V / 60V	45V / 90V	150 / 300 V	300 / 600 V
max. deviation	250 mV	100 μs	100 μs	100 μs	100 μs
		260 / 180 mV	180 / 80 mV	1.8 / 1.4 V	2.2 / 1.8 V
<b>Output impedance</b>					
CV, 0-1 kHz	< 0.8 mΩ	< 3 mΩ	< 1.8 mΩ	< 30 mΩ	< 60 mΩ
CV, 1-100 kHz	< 12 mΩ	< 25 mΩ	< 18 mΩ	< 250 mΩ	< 600 mΩ
<b>Pulsating load</b>					
max. tolerable AC component of load current					
f > 1 kHz	25 Arms	20 Arms	11 Arms	<i>t.b.d.</i>	<i>t.b.d.</i>
f < 1 kHz	220 Apeak	110 Apeak	75 Apeak	22 Apeak	11 Apeak

<b>Insulation</b>	
input / output creepage / clearance	3750 Vrms (1 min.) 8 mm
input / case output / case	2500 Vrms 1000 V DC <sup>3</sup>
<b>Safety</b>	cTUVus / EN 60950 / EN 61010
<b>EMC Power Supply Standard</b>	<b>EN 61204-3,</b> Emission: residential, <b>light</b> industrial environment (CISPR22-Class <b>B</b> ) Immunity: industrial environment
<b>Generic Emission Generic Immunity</b>	<b>EN 61000-6-3,</b> residential, <b>light</b> industrial environment (EN 55022 <b>B</b> ) <b>EN 61000-6-2,</b> industrial environment
<b>Operating Temperature at full load</b>	- 20 to + 50 °C derate output to 75% at 60 °C
<b>Humidity</b>	max. 95% RH, non condensing, up to 40 °C max. 75% RH, non condensing, up to 50 °C
<b>Storage temperature</b>	- 40 to + 85 °C
<b>Thermal protection</b>	Output shuts down in case of insufficient cooling
<b>MTBF</b>	500 000 hrs

	SM 18-220	SM 66-AR-110	SM 100-AR-75	SM 330-AR-22	SM 660-AR-11
<b>Hold-Up time</b>					
V <sub>out</sub> = 100%, P <sub>out</sub> = 3300W	6 ms	12 ms	12 ms	12 ms	12 ms
I <sub>out</sub> = 100%, P <sub>out</sub> = 3300W	13 ms	13 ms	13 ms	13 ms	13 ms
V <sub>out</sub> = 100%, P <sub>out</sub> = 1750W	18 ms	24 ms	24 ms	24 ms	24 ms
@ 400 V AC input					
<b>Turn on delay</b> after mains switch on			1.4 s		
<b>Inrush current</b>			15 A		

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<b>Series operation</b> max. total voltage Master / Slave operation <sup>4</sup>	1000 V <sup>3</sup> yes	1000 V <sup>3</sup> yes	1000 V <sup>3</sup> yes	1330 V <sup>3</sup> yes	1400V <sup>3</sup> yes
<b>Parallel operation</b> Normal Master / Slave operation <sup>4</sup>	no limit max. 8 units				
<b>Remote sensing</b> max. voltage drop per load lead	2 V				
<b>Limits</b> <b>Voltage</b> adjust range <b>Current</b> adjust range	0 - 101% 0 - 101%				
<b>Potentiometers &amp; Encoders</b> front panel control with knobs resolution	15 bits.				
<b>Meters</b> scale    voltage scale    current accuracy read output read limit setting (d = digit)	4 digit 0 - 18.00 V 0 - 220.0 A 0.2% + 2 d 0.3% + 2 d	4 digit 0 - 66.00 V 0 - 110.0 A 0.2% + 2 d 0.3% + 2 d	4 digit 0 - 100.0 V 0 - 75.00 A 0.2% + 2 d 0.3% + 2 d	4 digit 0 - 330.0 V 0 - 22.00 A 0.2% + 2 d 0.3% + 2 d	4 digit 0 - 660.0 V 0 - 11.00 A 0.2% + 2 d 0.3% + 2 d

<b>Mounting</b>	Stacking of units allowed, air flow is from left to right.
<b>Input Terminals</b>	Screw Terminals for cable 2.5 - 4 mm <sup>2</sup> , 3 phase + earth (no neutral required)
<b>Output Terminals</b>	M8 bolts
<b>Programming connector</b>	RJ45-connector for Ethernet (LAN) at rear panel.
<b>Interlock</b>	Input for contact at rear panel, see photo of rear panel on page 1-6
<b>Cooling</b> audio noise level  airflow	Low noise blower, fan speed adapts to temperature of internal heatsink. ca. 50 dBA at full load, 25 °C ambient temperature, 1 m distance ca. 57 dBA at full load, 50 °C ambient temperature, 1 m distance From left to right
<b>Enclosure</b> degree of protection	IP20
<b>Dimensions</b> front panel: h x w  behind front panel: h x w x d	88.1 x 483 mm (19", 2 U)  86 x 433 x 455 mm with optional interfaces, required depth is 500...530mm.
<b>Weight</b>	15 kg

Notes: 1. Measured at full load  
2. Signal latency depends on the interface used and data traffic.  
3. See 'Safety Instructions' in the manual.  
4. With optional 'plug and play' interface.

CV= Constant Voltage  
CC= Constant Current

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

The information in this document is  
subject to change without notice

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## 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
- Driving PWM-Controlled DC motors
- Accurate current sources
- Aerospace and military equipment

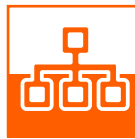
## Standard Features



### Digital Voltage and Current Settings

Reliable, longlife digital encoders are implemented 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.



### Ethernet Controller

Ethernet interface for programming and monitoring.



### Sequencer

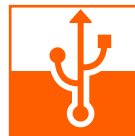
Arbitrary Waveform generator or standalone automation.



### High Voltage Isolation

A high output isolation allows series operation up to 1000 V for low voltage units and up

to 1400 V for high voltage units.



### USB-Input

Under development:  
Front panel USB-Input for exchange of settings and

waveforms (Host).

## Available Options



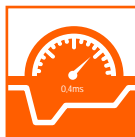
### Software Control and Interfaces

Field installable interfaces :

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

Order Codes :

- INT MOD ANA
- INT MOD DIG
- INT MOD CON
- INT MOD SER
- INT MOD SIM



### High Speed Programming

A 10 to 20 times higher programming speed (down to 0.2 ms rise time at full load) and lower output capacitance. Excellent for laser applications, test systems or as current source with low parallel capacitance as used in plasma chambers.

Order Codes :

- SM 18-220 - P300
- SM 66-AR-110 - P302
- SM100-AR-75 - P303
- SM 330-AR-22 - P304
- SM 660-AR-11 - P305



### Two-Quadrant Output Power Sink

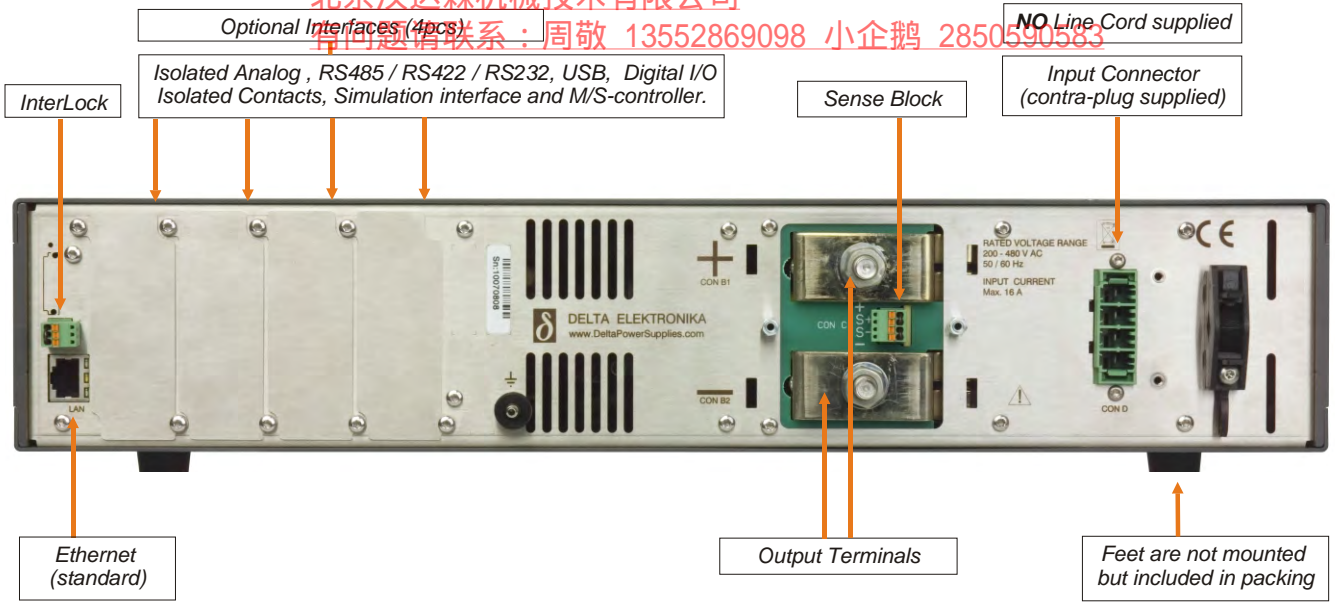
Two quadrant operation maintains the output voltage constant regardless the output power is positive or negative. Ideal for PWM-speed controlled DC-Motors and ATE systems.

Order Codes :

- SM 18-220 - P306
- SM 66-AR-110 - P308
- SM100-AR-75 - P309
- SM 330-AR-22 - P310
- SM 660-AR-11 - P311

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Safety Covers supplied for in- and output (not shown)

