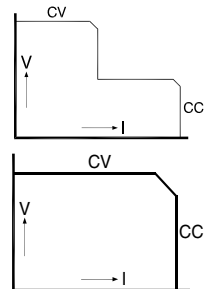




SM 3300 - Series 3300 W DC POWER SUPPLIES

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

	SM 18-220	SM 66-AR-110	SM 100-AR-75	SM 330-AR-22	SM 660-AR-11
Output 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
Input AC 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 _{out max} (W), I _{in} (A) 205 V : P _{out max} (W), I _{in} (A) 180 V : P _{out max} (W), I _{in} (A) <i>Three phase</i> 190 V : P _{out max} (W), I _{in} (A) 180 V : P _{out max} (W), I _{in} (A) power factor single phase internal fuses standby input power (V _o =I _o =0) standby input power (V _o =V _{max})	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
Efficiency 400 V AC, 3 ph input, full load	89 %	90 %	90 %	91 %	92 %
Regulation					
Load 0 - 100% CV Line 180 - 528 V AC CV (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% CC Line 180 - 528 V AC CC (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
Ripple + noise rms (BW=300 kHz) CV p-p (BW=20 MHz) CV rms (BW=300 kHz) CC p-p (BW=20 MHz) CC <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
Temp. coeff., per °C⁻¹ CV CC			35.10 ⁻⁶ 60.10 ⁻⁶		
Stability¹ after 1 hr warm-up during 8 hrs CV CC t _{amb} = 25 ± 1 °C, V _{in} = 400 V AC internal voltage sensing for CC-stab.			6.10 ⁻⁵ 9.10 ⁻⁵		

Programming speed² <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
Rise time (10 - 90%) 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
Fall time (90 - 10%) 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

Programming speed ² 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
Rise time (10 - 90%) 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
Output Capacitance (typical)	720 µF	315 µF	95 µF	31 µF	15 µF
Fall time (90 - 10%) 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
Recovery time 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
Output impedance CV, 0-1 kHz CV, 1-100 kHz	< 0.8 mΩ < 12 mΩ	< 3 mΩ < 25 mΩ	< 1.8 mΩ < 18 mΩ	< 30 mΩ < 250 mΩ	< 60 mΩ < 600 mΩ
Pulsating load max. tolerable AC component of load current f > 1 kHz f < 1 kHz	25 Arms 220 Apeak	20 Arms 110 Apeak	11 Arms 75 Apeak	<i>t.b.d.</i> 22 Apeak	<i>t.b.d.</i> 11 Apeak

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

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

Series operation max. total voltage Master / Slave operation ⁴	1000 V ³ yes	1000 V ³ yes	1000 V ³ yes	1330 V ³ yes	1400V ³ yes
Parallel operation Normal Master / Slave operation ⁴	no limit max. 3 units				
Remote sensing max. voltage drop per load lead	2 V				
Limits Voltage adjust range Current adjust range	0 - 101% 0 - 101%				
Potentiometers & Encoders front panel control with knobs resolution	15 bits.				
Meters 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

Mounting	Stacking of units allowed, air flow is from left to right.
Input Terminals	Screw Terminals for cable 2.5 - 4 mm ² , 3 phase + earth (no neutral required)
Output Terminals	M8 bolts
Programming connector	RJ45-connector for Ethernet (LAN) at rear panel.
Interlock	Input for contact at rear panel, see photo of rear panel on page 1-6
Cooling 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
Enclosure degree of protection	IP20
Dimensions 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 <i>with optional interfaces, required depth is 500...530mm.</i>
Weight	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

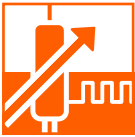
Specifications measured at
 $T_{amb} = 25 \pm 5 \text{ °C}$ and $V_{in} = 400 \text{ VAC}$,
50 Hz, 3 phase, unless otherwise noted.

The information in this document is
subject to change without notice

Typical Applications

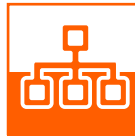
- Solar inverter testing, PV-Simulation
- Car testing systems
- ATE in industrial production lines
- Plasma chambers
- Automotive battery simulations
- Controlled battery (dis)charging
- Lasers
- Driving PWM-Controlled DC motors
- Accurate current sources
- Aerospace and military equipment

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.



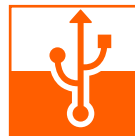
Sequencer

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
- INT MOD M/S



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

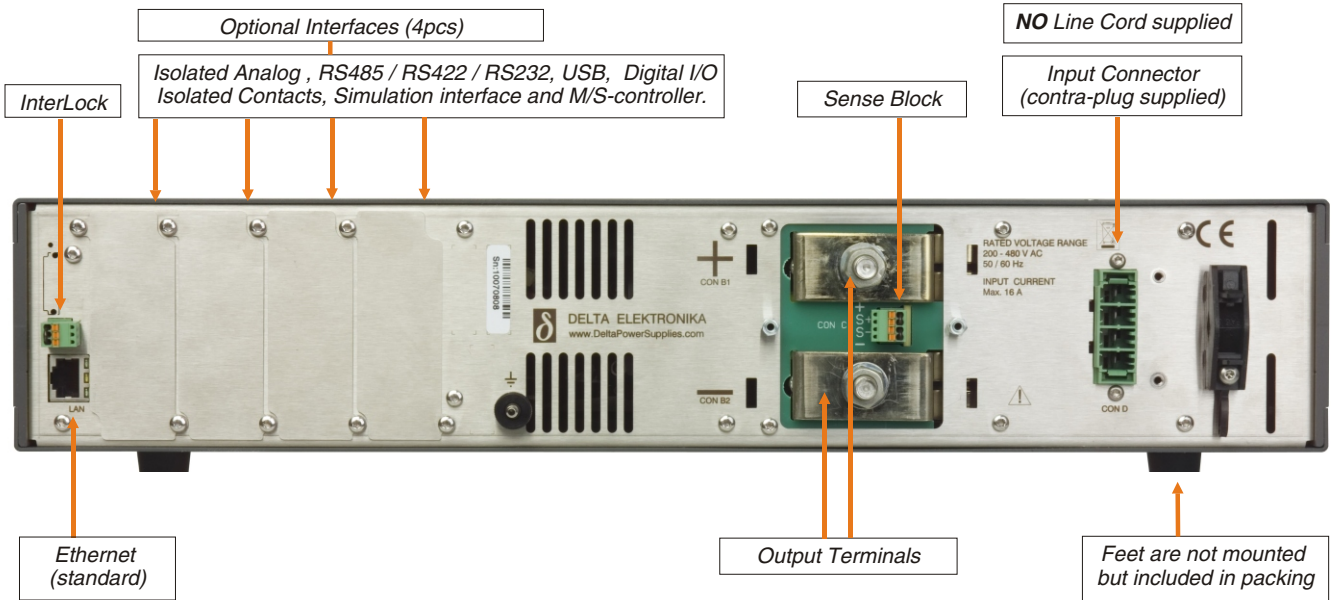


Two-Quadrant Output Power Sink

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



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

