

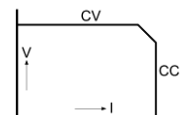
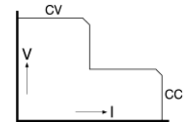


SM3300 - Series 3300W DC POWER SUPPLIES



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
SM660-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
DC Power terminals					
voltage	0 - 18 V	0 - 66 V	0 - 100 V	0 - 330 V	0-660V
current	0 - 220 A	0 - 110 A	0 - 75 A	0 - 22 A	0-11 A
AC Input					
1 or 3 phase, 48 - 62 Hz	180-528 V	180-528 V	180-528 V	180-528 V	180-528 V
rated voltage range	200 - 480 V	200 - 480 V	200 - 480 V	200 - 480 V	200 - 480 V
rated frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
rated current	Max. 16 A	Max. 16 A	Max. 16 A	Max. 16 A	Max. 16 A
current (400 V / 3 ph, 3300W)	5.8 A	5.6 A	5.6 A	5.6 A	5.6 A
power factor, 3300W, 1750W	0.94, 0.92	0.94, 0.92	0.94, 0.92	0.94, 0.92	0.94, 0.92
<i>Power Derating vs input</i>					
<i>Single phase:</i>					
230 V : P _{out} max (W), I _{in} (A)	3050, 16	3100, 16	3100, 16	3200, 16	3200, 16
205 V : P _{out} max (W), I _{in} (A)	2650, 16	2700, 16	2700, 16	2800, 16	2800, 16
180 V : P _{out} max (W), I _{in} (A)	2300, 16	2400, 16	2400, 16	2400, 16	2400, 16
<i>Three phase</i>					
190 V : P _{out} max (W), I _{in} (A)	3300, 12.5	3300, 12.5	3300, 12.5	3300, 12.5	3300, 12.5
180 V : P _{out} max (W), I _{in} (A)	3100, 12.5	3100, 12.5	3100, 12.5	3100, 12.5	3100, 12.5
power factor single phase	0.99	0.99	0.99	0.99	0.99
internal fuses	20 AT	20 AT	20 AT	20 AT	20 AT
standby input power (V _o =I _o =0)	30 W	30 W	30 W	30 W	30 W
standby input power (V _o =V _{max})	60 W	50 W	50 W	50 W	60 W
Efficiency	89 %	90 %	90 %	91 %	92 %
400 V AC, 3 ph input, full load					
Regulation					
Load 0 - 100% CV	2.5 mV	5 mV	5 mV	5 mV	5 mV
Line 180 - 528 V AC CV (external voltage sense)	0.2 mV	1 mV	1 mV	3 mV	4 mV
Load 0 - 100% CC	12 mA	6 mA	2 mA	1.2 mA	1.2 mA
Line 180 - 528 V AC CC (internal voltage sense, after warm up)	3 mA	1 mA	0.5 mA	0.2 mA	0.2 mA
		33 / 66V	50 / 100 V	165 / 330 V	330 / 660 V
Ripple + noise					
rms (BW=300 kHz) CV	3 mV	7 mV	7 mV	10 mV	15 mV
p-p (BW=20 MHz) CV	12 mV	18 mV	22 mV	50 mV	120 mV
rms (BW=300 kHz) CC					
p-p (BW=20 MHz) CC	50 mA	15 / 7.5 mA	6 / 2 mA	4.5 / 1.5 mA	1.8 / 0.6 mA
<i>CC-ripple at full load</i>	250 mA	90 / 45 mA	60 / 20 mA	24 / 8 mA	7.5 / 2.5 mA
Programming & monitoring accuracy (excluding INT MOD ANA)					
Voltage	± 0.1%	± 0.1%	± 0.1%	± 0.1%	± 0.1%
Current	± 0.18%	± 0.25%	± 0.25%	± 0.15%	± 0.15%
Temp. coeff., per °C⁻¹ CV			35.10 ⁻⁶		
CC			60.10 ⁻⁶		
Stability ¹ after 1 hr warm-up during 8 hrs CV					
CC			6.10 ⁻⁵		
t _{amb} = 25 ± 1 °C, V _{in} = 400 VAC (internal voltage sensing for CC-stab.)			9.10 ⁻⁵		

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

Notes: 1. Measured at full load. 2. Signal latency depends on the interface used & data traffic.

3. See "Safety instructions" 4. With optional Interface.

Programming speed ² High Speed Version (resistive load)	SM 18-220 <i>Option P300</i>	SM 66-AR-110 <i>Option P302</i>	SM 100-AR-75 <i>Option P303</i>	SM 330-AR-22 <i>Option P304</i>	SM 660-AR-11 <i>Option P305</i>
Rise time (10 - 90%) output voltage step time, (load = 3300W) time, (load = 330 W) output voltage step time, (load = 3300W) 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 → 66 V 0.44 ms 0.35 ms	0 → 50V 0.46 ms 0.46 ms 0 → 100 V 0.53 ms 0.47 ms	0 → 165 V 0.38 ms 0.35 ms 0 → 330 V 1.6 ms 0.8 ms	0 → 330 V 0.8 ms 0.7 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)	750 µF	315 µF	95 µF	31 µF	15 µF
Fall time (90 - 10%) output voltage step time, (load = 3300W) time, (load = 330 W) output voltage step time, (load = 3300W) time, (load = 330 W)	15 / 18 V → 0 V 0.19 / 0.27 ms 0.52 / 0.75 ms - - -	33 V → 0 V 0.34 ms 1.6 ms 66 V → 0 V 0.58 ms 5.7 ms	50 V → 0 V 0.42 ms 1.4 ms 100 V → 0 V 0.53 ms 5 ms	165 V → 0 V 0.45 ms 4.3 ms 330 V → 0 V 2.1 ms 17 ms	330 V → 0 V 0.82 ms 8 ms 660 V → 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 di/dt of load step output voltage time, @ 50 - 100% load step max. deviation	50 mV 2.7 A/µs 15V 100 µs 250 mV	33 V / 66 V 100 mV 1.7 / 0.7 A/µs 30V / 60V 100 µs 260 / 180 mV	50 V / 100 V 100 mV 1.1 / 0.5 A/µs 45V / 90V 100 µs 180 / 80 mV	165 V / 330 V 500 mV 0.35 / 0.17 A/µs 150 / 300 V 100 µs 1.8 / 1.4 V	330 V / 660 V 800 / 500 mV 0.16 / 0.08 A/µs 300 / 600 V 100 µs 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 A _{rms} 220 A _{peak}	20 A _{rms} 110 A _{peak}	11 A _{rms} 75 A _{peak}	<i>t.b.d.</i> 22 A _{peak}	<i>t.b.d.</i> 11 A _{peak}

Insulation AC power terminals / DC power term. creepage / clearance AC power terminals / case DC power terminals / case	3750 V _{rms} (1min.) 8 mm 2500 V _{rms} 1000 V DC ³	3750 V _{rms} (1min.) 8 mm 2500 V _{rms} 1330 V DC ³	3750 V _{rms} (1min.) 8 mm 2500 V _{rms} 1400 V DC ³
Safety	cTUVus / EN 60950 / EN 61010		
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		
Operating Temperature at full load	-20 to +50 °C derate output to 75% at 60 °C		
Humidity	maximum 95% RH, non condensing, up to 40 °C maximum 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 (@ 400 VAC input) V _{out} = 100%, P _{out} = 3300 W I _{out} = 100%, P _{out} = 3300 W V _{out} = 100%, P _{out} = 1750 W	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				

Notes: 1. Measured at full load. 2. Signal latency depends on the interface used & data traffic. 3. See "Safety instructions" 4. With optional Interface. For details see 'Datasheet Interfaces SM3300 series'.

	SM 18-220	SM 66-AR-110	SM 100-AR-75	SM 330-AR-22	SM 660-AR-11
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	1330 V ³ yes
Parallel operation Normal Master / Slave operation ⁴	no limit maximum 8 units				
Remote sensing max. voltage drop per load lead	2 V				
Limits Voltage adjust range Current adjust range	0 - 101 % 0 - 101 %				
Potentiometers front panel control with knobs resolution	15 bits				
Meters scale voltage scale current accuracy read output read limit setting	4 digit 0.00 - 18.00 V 0.0 - 220.0 A 0.2% + 2 digit 0.3% + 2 digit	4 digit 0.00 - 66.00 V 0.0 - 110.0 A 0.2% + 2 digit 0.3% + 2 digit	4 digit 0.0 - 100.0 V 0.00 - 75.00 A 0.2% + 2 digit 0.3% + 2 digit	4 digit 0.0 - 330.0 V 0.00 - 22.00 A 0.2% + 2 digit 0.3% + 2 digit	4 digit 0.0 - 660.0 V 0.00 - 11.00 A 0.2% + 2 digit 0.3% + 2 digit

Mounting	stacking of units allowed, air flow is from left to right
AC Terminals (CON D)	screw terminals for wire 2.5 - 4 mm ² , 3 phase + earth (no neutral)
DC Terminals (CON B1 & B2)	M8 bolts
Programming connectors (LAN)	standard with RJ45-connector for Ethernet at rear panel, 100 Mb/s, full-duplex
Interlock (CON A)	input for contact at rear panel
Cooling audio noise level air flow	low noise blower, fan speed adapts to temperature of internal system 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 448 x 455 mm (excluding feet) with optional interfaces the required depth is 500...530mm
Weight	15 kg

CV = Constant Voltage
CC = Constant Current

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

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

Notes:

1. Measured at full load.
2. Signal latency depends on the interface used and data traffic.
3. See safety Instructions in the operating manual.
4. With optional 'plug and play' interface. For details see 'Datasheet Interfaces SM3300 series'.

Typical Applications

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

Standard Features



Digital CV- and CC-Settings

Reliable, long-life 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 Interface

Ethernet interface for programming and monitoring



Sequencer

Arbitrary Waveform generator or standalone automation.



High Voltage Isolation

A high DC output isolation allows floating operation up to 1000 V for SM18-220, SM66-AR-110 and SM100-AR-75, and up to 1330V and 1400 V for SM330-AR-22 and SM660-AR-11.



USB-Input

Not yet available: Front and rear panel USB-Input for exchange of settings and waveforms (Host / Type-A).

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
- Simulation interface

Order Codes :

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



High Speed Programming

A 10 to 20 times higher programming speed (down to 0.2ms 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
- SM 100-AR-75 – P303
- SM 330-AR-22 – P304
- SM 660-AR-11 – P305



Two-Quadrant Output Power Sink

Two quadrant operation maintains the DC 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
- SM 100-AR-75 – P309
- SM 330-AR-22 – P310
- SM 660-AR-11 – P311

