DELTA ELEKTRONIKA B.V.
DC POWER SUPPLIES

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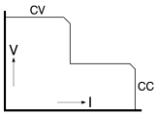
SM3300 - Series 3300W DC POWER SUPPLIES

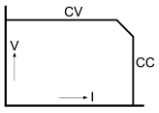
CE

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

TÜVRheinland C US





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 - Power Sink

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

	SM18-220	SM66-AR-110	SM100-AR-75	SM330-AR-22	SM660-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
Power Derating vs input					
Single phase:					
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
Three phase					
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 400 V AC, 3 ph input, full load	89 %	90 %	90 %	91 %	92 %
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
CC-ripple at full load	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}				

Programming speed [2] Standard Version (resistive load)	SM18-220	SM66-AR-110	SM100-AR-75	SM330-AR-22	SM660-AR-11
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** ***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	0 → 15 / 18 V	0 → 33 V	0 → 50V	0 → 165 V	0 → 330 V
time, (load = 3300W)	0.17 / 0.24 ms	0.34 ms	0.46 ms	0.38 ms	0.8 ms
time, (load = 330 W)	0.13 / 0.15 ms	0.33 ms	0.46 ms	0.35 ms	0.7 ms
output voltage step	-	0 → 66 V	0 → 100 V	0 → 330 V	0 → 660 V
time, (load = 3300W)	-	0.44 ms	0.53 ms	1.6 ms	2.8 ms
time, (load = 330 W)	-	0.35 ms	0.47 ms	0.8 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	15 / 18 V → 0 V	33 V → 0 V	50 V → 0 V	165 V → 0 V	330 V → 0 V
time, (load = 3300W)	0.19 / 0.27 ms	0.34 ms	0.42 ms	0.45 ms	0.82 ms
time, (load = 330 W)	0.52 / 0.75 ms	1.6 ms	1.4 ms	4.3 ms	8 ms
output voltage step	-	66 V → 0 V	100 V → 0 V	330 V → 0 V	660 V → 0 V
time, (load = 3300W)	-	0.58 ms	0.53 ms	2.1 ms	3.4 ms
time, (load = 330 W)	-	5.7 ms	5 ms	17 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		33 V / 66 V	50 V / 100 V	165 V / 330 V	330 V / 660 V
recovery within	50 mV	100 mV	100 mV	500 mV	800 / 500 mV
di/dt of load step	2.7 A/µs	1.7 / 0.7 A/µs	1.1 / 0.5 A/µs	0.35 / 0.17 A/µs	0.16 / 0.08 A/µs
output voltage	15V	30V / 60V	45V / 90V	150 / 300 V	300 / 600 V
time, @ 50 - 100% load step	100 µs	100 µs	100 µs	100 µs	100 µs
max. deviation	250 mV	260 / 180 mV	180 / 80 mV	1.8 / 1.4 V	2.2 / 1.8 V
Output impedance					
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
Pulsating load					
max. tolerable AC component of load current					
f > 1 kHz	25 A_{rms}	20 A_{rms}	11 A_{rms}	*t.b.d.*	*t.b.d.*
f < 1 kHz	220 A_{peak}	110 A_{peak}	75 A_{peak}	22 A_{peak}	11 A_{peak}

Insulation				
AC power terminals / DC power term.	3750 V_{rms} (1min.)		3750 V_{rms} (1min.)	3750 V_{rms} (1min.)
creepage / clearance	8 mm		8 mm	8 mm
AC power terminals / case	2500 V_{rms}		2500 V_{rms}	2500 V_{rms}
DC power terminals / case	1000 V DC [3]		1330 V DC [3]	1400 V DC [3]
Safety	cTUVus / EN 60950 / EN 61010			
EMC Emission	**EN 61326-1,** class B equipment (for use in domestic establishments)			
Immunity	**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 + 70 °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	6 ms	12 ms	12 ms	12 ms	12 ms
I_{out} = 100%, P_{out} = 3300 W	13 ms	13 ms	13 ms	13 ms	13 ms
V_{out} = 100%, P_{out} = 1750 W	18 ms	24 ms	24 ms	24 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'.

	SM18-220	SM66-AR-110	SM100-AR-75	SM330-AR-22	SM660-AR-11
Series operation					
max. total voltage	1000 V [3]	1000 V [3]	1000 V [3]	1330 V [3]	1330 V [3]
Master / Slave operation [4]	yes	yes	*yes*	yes	yes
Parallel operation					
Normal	no limit				
Master / Slave operation [4]	maximum 8 units				
Remote sensing					
max. voltage drop per load lead	2 V				
Limits **Voltage** adjust range	0 - 101 %				
Current adjust range	0 - 101 %				
Potentiometers					
front panel control with knobs					
resolution	15 bits				
Meters	4 digit	4 digit	4 digit	4 digit	4 digit
scale voltage	0.00 - 18.00 V	0.00 - 66.00 V	0.0 – 100.0 V	0.0 - 330.0 V	0.0 - 660.0 V
scale current	0.0 - 220.0 A	0.0 - 110.0 A	0.00 - 75.00 A	0.00 - 22.00 A	0.00 - 11.00 A
accuracy read output	0.2% + 2 digit	0.2% + 2 digit	0.2% + 2 digit	0.2% + 2 digit	0.2% + 2 digit
read limit setting	0.3% + 2 digit	0.3% + 2 digit	0.3% + 2 digit	0.3% + 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	low noise blower, fan speed adapts to temperature of internal system
audio noise level	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
air flow	From left to right
Enclosure degree of protection	IP20
Dimensions	
front panel: h x w	88.1 x 483 mm (19", 2 U)
behind front panel: h x w x d	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 ± 5 °C and Vin = 400 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

- PV-Simulation and inverter testing
- Car testing systems
- ATE in industrial production lines
- Plasma chambers
- Automotive battery simulations
- Controlled battery (dis)charging
- Lasers
- Sustainable energy
- PWM-controlled DC motor testing
- Accurate current sources
- Aerospace
- Military

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

Feature not yet available.
Front and rear panel USB inputs (Host / Type-A) are planned for the exchange of settings and waveforms.
A web interface is available for uploading sequences.

Options

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.

Option 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.

Option 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

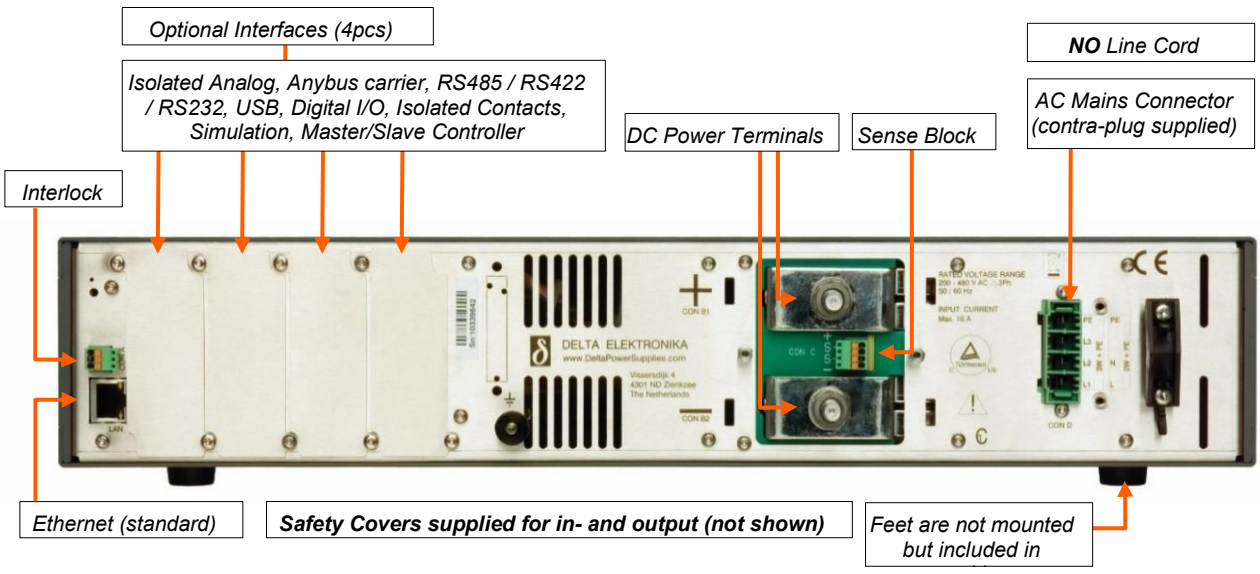
Interfaces

Plug-and-play extension modules

Interfacing and functional capabilities of the power supply can be extended at any time by inserting modules. Four slots are available at the rear of the power supply unit. Consult the interfaces data sheet for more information.

Modules:

- **Analog programming**
  (INT MOD ANA)
  High speed and accuracy
- **Anybus interface**
  (INT MOD ANY)
  Carrier for Anybus CompactCom 40 fieldbus modules:
  CANopen, EtherCAT, Ethernet/IP, Modbus-TCP, POWERLINK, PROFIBUS, PROFINET
- **Digital I/O**
  (INT MOD DIG)
  Interacts with sequencer
- **Isolated contacts**
  (INT MOD CON)
  Relay and interlock contacts
- **Serial communication**
  (INT MOD SER)
  RS232, RS485, RS422, USB
- **Simulation interface**
  (INT MOD SIM)
  For PV-simulation, foldback, etc.
- **Master/Slave**
  (INT MOD M/S)
  Series/parallel output configuration



Where to buy?

Visit our website to request a quote, free of charge.

Alternatively, contact us directly or get in touch with one of our authorized distributors.

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