DELTA ELEKTRONIKA B.V.
DC POWER SUPPLIES

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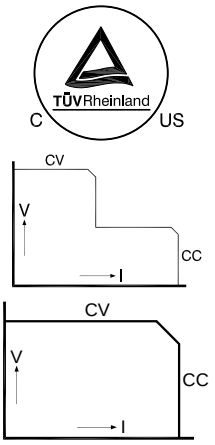
SM3300 - Series 3300 W DC POWER SUPPLIES

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	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
Input					
AC 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 / 66 V	*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**	50 mA	15 / 7.5 mA	6 / 2 mA	4.5 / 1.5 mA	1.8 / 0.6 mA
p-p (BW=20 MHz) **CC**	250 mA	90 / 45 mA	60 / 20 mA	24 / 8 mA	7.5 / 2.5 mA
CC-ripple at full load					
Temp. coeff., per °C [1] **CV**	35.10^{-6}				
CC	60.10^{-6}				
Stability [1]					
after 1 hr warm-up					
during 8 hrs **CV**	6.10^{-5}				
CC	9.10^{-5}				
t_{amb} = 25 ± 1 °C, V_{in} = 400 V AC					
internal voltage sensing for CC-stab.					

Programming speed [2] ***Standard Version*** (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	0 → 15 / 18 V	0 → 33 V	0 → 50V	0 → 165 V	0 → 330 V
time, (load = 3300 W)	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 = 3300 W)	-	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 = 3300 W)	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					
time, (load = 3300 W)	-	66 V → 0 V	100 V → 0 V	330 V → 0 V	660 V → 0 V
time, (load = 330 W)	-	11 ms	26 ms	25 ms	28 ms
	-	100 ms	260 ms	250 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	0 → 15 / 18 V	0 → 33 V	0 → 50 V	0 → 165 V	0 → 330 V
time, (load = 3300 W)	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 = 3300 W)	-	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)	720 µF	315 µF	95 µF	31 µF	15 µF
Fall time (90 - 10%)					
output voltage step	15 / 18 → 0 V	33 → 0 V	*50* → 0 V	165 → 0 V	330 → 0 V
time, (load = 3300 W)	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 → 0 V	100 → 0 V	330 → 0 V	660 → 0 V
time, (load = 3300 W)	-	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 Arms	20 Arms	11 Arms	*t.b.d.*	*t.b.d.*
f < 1 kHz	220 Apeak	110 Apeak	75 Apeak	22 Apeak	11 Apeak

Insulation	
input / output	3750 Vrms (1 min.)
creepage / clearance	8 mm
input / case	2500 Vrms
output / case	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	**EN 61000-6-3**, residential, **light** industrial environment (EN 55022 **B**)
Generic Immunity	**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	6 ms	12 ms	12 ms	12 ms	12 ms
I_{out} = 100%, P_{out} = 3300W	13 ms	13 ms	13 ms	13 ms	13 ms
V_{out} = 100%, P_{out} = 1750W	18 ms	24 ms	24 ms	24 ms	24 ms
@ 400 V AC input					
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. 8 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 *with optional interfaces, required depth is 500...530mm.*
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 ± 5 °C and Vin = 400 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

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 :

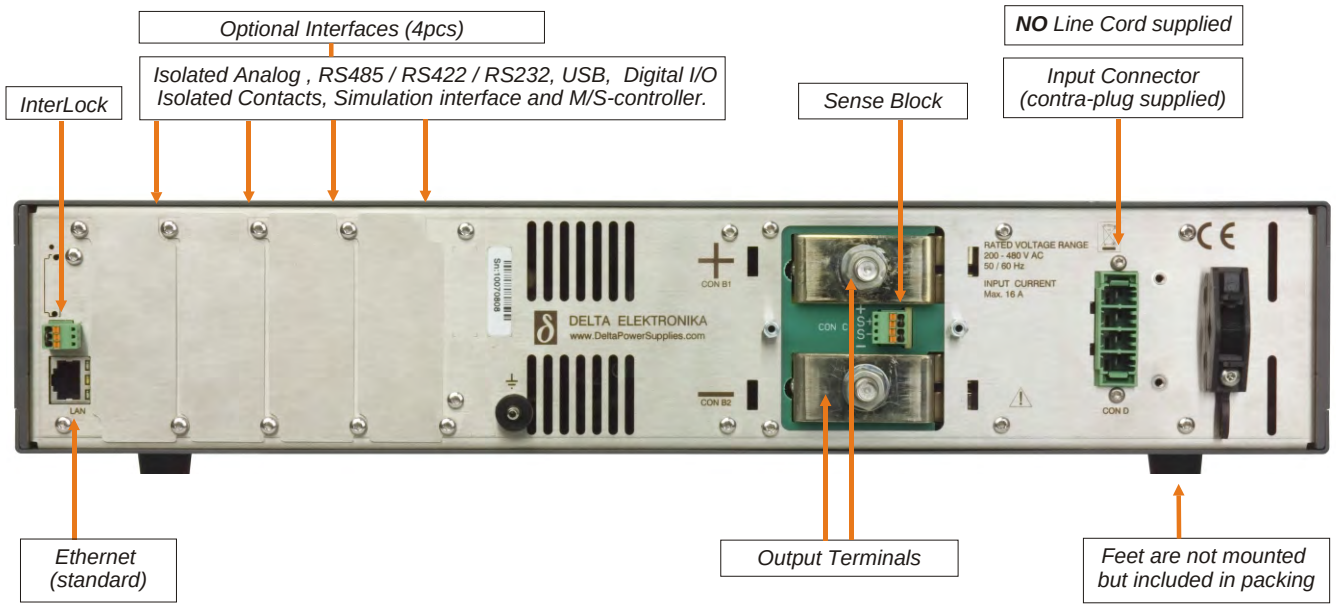
- SM 18-220 - P300
- SM 66-AR-110 - P302
- SM100-AR-75 - P303
- SM 330-AR-22 - P304
- SM 660-AR-11 - P305

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)

Your distributor: